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Agri-environmental Policy in the European Union: Who's in Charge?

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Abstract

The EU has argued that some agricultural subsidies are needed to provide the optimal amount of externalities (both positive and negative) produced by agriculture. The argument is that agriculture is "multifunctional" and externalities such as rural development and landscape would be underproduced, while some forms of pollution (such as nitrogen runoff) would be overproduced without government intervention. Meanwhile, the United States has raised the concern that multifunctionality is primarily an argument to transfer income to producers. One way to try and determine how much of these non-commodity payments are directed to externalities and how much is intended to distribute income to producers is to analyze the variation of the programs among the different member states of the EU. We estimate the degree to which environmental characteristics, agricultural characteristics and political economy variables determine the objective and amount of funding each member states uses to address environmental externalities (both positive and negative). Results indicate that little of the variance in agri-environmental expenditure can be explained by the difference in negative externalities, neither is there clear evidence that the payments are substituting for traditional agricultural subsidies. However, demand for environmental services and political variables seem to be the driving motivators behind a country's decision to spend money on agri-environmental programs.

Introduction

In the European Union, 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, and the safety of Genetically-Modified Organisms. At the same time, the EU has experienced increasing pressure to liberalise agricultural trade and to remove production subsidies. One result has been the growth in agri-environmental programs (AEPs) which purportedly encourage environmentally sustainable production and rural development. Other countries have responded sceptically to these programs, arguing that they are simply production subsidies in another guise. The response of the European Commission is that AEPs address genuine externalities of agricultural production. This paper compares the use of AEPs among member states over time to identify whether they are simply substitutes for traditional agricultural subsidies or are, as the EU claims, a means to encourage the optimal production of positive and negative externalities.

Within the EU, agriculture and the environment are largely regarded as complements. For example, the EU is concerned about the abandonment of land, and subsidises farmers to retain marginal pasture in cultivation. Compared to their more targeted U.S. counterparts, such as the Conservation Reserve Program, EU programs may appear to lack focus. Not surprisingly, AEPs have been viewed with scepticism in some quarters (specifically in the United States), the concern being that they are just a more acceptable way of delivering subsidies to farmers. 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). 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 same report later notes that "environmental payments are a statistically significant determinant of agricultural production and trade." The EU, in contrast, argues that their programs are addressing legitimate externalities demanded by its citizens.

In this paper, we use econometric techniques to test whether EU agri-environmental programs are in response to specific externalities or, alternatively, whether they are substitutes for more traditional forms of agricultural support. The question we are trying to answer is: why did European member states begin an unprecedented switch of production subsidies to payments for the non-marketed environmental public goods of agriculture? We want to better understand the internal political bargain that led to this change.

Discovering the true motivation has several important implications for Canadian agricultural policy. First, AEPs are likely to change producer behaviour and production

patterns in the EU. Second, the use by the EU of the Green Box sets an important precedent (Ervin, 1999). Usage of the Green Box may well increase as other nations become attracted to the use of AEPs, including the United States and Canada. Last, understanding the political tradeoffs associated with these programs will give us insight into the feasible outcomes of trade negotiations. If AEPs and other Rural Development Programs are acting as substitutes for price supports, making further cuts in direct subsidies may be facilitated by generous rules around the WTO's Green Box. However, if these programs are not substitutes, but an additional subsidy going to a new claimant group, tighter rules to encourage targeting, for example, may constrain the negative production effects while maximising the environmental benefits produced.

To help define possible motivations we have constructed four 'lenses' each of which represents a particular motivation for the AEPs. Each lens represents a specific political bargain, with its own implications for production and possible trade agreements. We use the four lenses to help explain the results of our econometric analysis; a person looking through one particular lens would expect to see expenditures on the programs correlated with various explanatory variables in specific ways. If we observe those correlations, then we can assign some validity to the lens. It should be noted that none of the lens has an exclusive command. The motivations behind EU policy are likely to be mixed, and there may be motivations of which we remain unaware. While all or none of the lenses might project the 'right' view, this does not diminish the importance of investigating the motivation, and from this determining the dominant policy-making group. In particular, understanding the nature of the political bargain and the lobbies that have the most influence will allow us to make some predictions regarding the potential effects of various trade bargains, such as new WTO rules.

In this paper we discuss the implications for Canada and for future trade agreements by examining four possible motivations for AEPs in Europe. Each motivation is represented by a lens. To begin we provide some background to AEPs, and then discuss the stakeholders in the decision-making process and the associated lenses. We present various hypotheses associated with each of the lenses and then test these hypotheses econometrically using data on AEP expenditure. The results are discussed in terms of the trade implications for Canada, and our conclusions end the paper.

The European Approach to Agri-environmental Programs

The European Common Agricultural Policy (CAP) has been at the heart of the European Community since its inception in the chaos and food insecurity of post-war Europe (Judt, 2005). It has been seen as a guarantee of productivity and also as a common thread joining different nations together. However, CAP production subsidies and improved productivity have led to spoilage, high storage costs, and overseas 'dumping'. By 1973, the CAP accounted for 80 per cent of the budget of the European Community but by 2000 it had declined to 40 percent (Federico, 2005). In a speech in New Zealand, the EU Agricultural Commissioner succinctly commented, 'healthy production became overproduction, and the associated level of public spending became

a problem' (Fischer Boel, 2006). A combination of public dissatisfaction with the wastage of the CAP, the enlargement of the EU to 27 member states, and pressure from EU trading partners, especially during the Uruguay Round, made change inevitable. One solution might have been to continue in the old production-supporting way, but to deny this assistance to farmers in the newly-acceding member states. This approach would have been contrary to the commonality of EU policy and very hard to justify to other agriculture-exporting states. The only other route was to reduce the price supports. This latter route was taken, providing the EU with a range of ways in which to implement the reductions.

In considering these, it is important to bear in mind the considerable influence which agricultural lobby groups still have in decision-making at both the member state and EU level. Despite its apparent decline in economic importance, accounting for only single digit figures of GDP for most EU-15 member states, the agricultural lobby remains influential (Keeler, 1996).

The process of integrating conservation into agricultural policy is hardly new, but prior to 1992 such integration took place primarily at the member state level. In addition, concerns over agriculture's damage to the natural environment tended to come from northern concerns (Denmark, Germany, the Netherlands, the United Kingdom and northern Italy), while southern concerns tended be over rural depopulation and especially land abandonment (France, the Alpine countries, southern Italy, Spain, Portugal). Early measures included the northern-led EC 795/85 of 1985 which permitted member states to fund agri-environmental incentive schemes in environmentally-sensitive areas, the areas to be defined by the states. The schemes were taken up by the northern states, especially Britain and Germany, but most southern states took little action (Dabbert et al., 1998; Fairbrass and Jordan, 2001; Brouwer and Van der Straaten, 2002).[1]

The shortcomings of EC 795/85 were addressed in EC 2078/92, the agri-environmental regulations introduced as part of the 1992 'MacSharry Reforms' of EU agricultural policy. The regulation is noteworthy for providing financing from the 'guarantee' section of the European Agriculture Guidance and Guarantee Fund (EAGGF), putting agri-environmental schemes on the same financial footing as the CAP. EC 2078/92 made mandatory the introduction of agri-environmental programmes across all states and addressed the socio-economic concerns, especially over land abandonment and rural depopulation, of the southern states (Baldock et al., 1996). Other 'additional measures', dating from the 1992 MacSharry Reforms, are money for the early retirement of farmers, compensatory measures to support farmers in mountainous or environmentally challenging regions (Least Favoured Areas or LFAs), and measures to support forestry. Each additional measure requires some co-financing from member-states, the share varying by region. Finally, by allowing all land, and not just environmentally-sensitive land, to be included in agri-environmental schemes, the regulation provided a strong basis for paid stewardship across the community, as well as giving all farmers possible access to subsidies through AEPs.

[1] For example, Portugal did not even bother to translate the text.

The process of policy integration and decoupling was continued in the Agenda 2000 reforms which developed two 'pillars' within the EAGGF. Pillar 1 contains funding for production support, still the great majority of the money. Pillar 2 contains funding for Rural Development Regulations (RDRs) which are activities undertaken by member states to improve their rural areas. Agri-Environmental Programmes form part of RDRs, and take up the largest share of RDR money, as figure 1 indicates. Other typical RDR expenditures go to farmer early retirement, training programmes, and afforestation (MAFF, 2000). Further reforms took place in 2003, including making 'modulation' compulsory. The EC now requires member states to transfer a percentage of Pillar 1 money to Pillar 2. The transfer from Pillar 1 to Pillar 2 will grow to a minimum of five per cent, although member states may transfer more if they wish. In 2005, 'cross-compliance' became compulsory after being voluntary and somewhat ineffective (Osterburg, 2004). This means that farmers receiving Pillar 1 money must keep their land at Good Farming Practice (GFP) standard. Very few farmers could continue without Pillar 1 money, and so GFP is binding in practice. However, as far as we know, no farmer has been charged with not meeting the GFP minimum as of the time of writing. Further, some studies of cross-compliance have shown that the results are not necessarily optimal because of the costs of compliance with GFP to farmers on marginal and erodible land. The risk of land abandonment increases with the costs of maintaining GFP, reflecting the need, in the views of some writers, for a more site-specific calculation of AEPs. Varelo-Ortega and Calatrava,, (2004) summarize the complexities of cross-compliance especially in relation to water conservation in the Mediterranean, but also to northern member states.

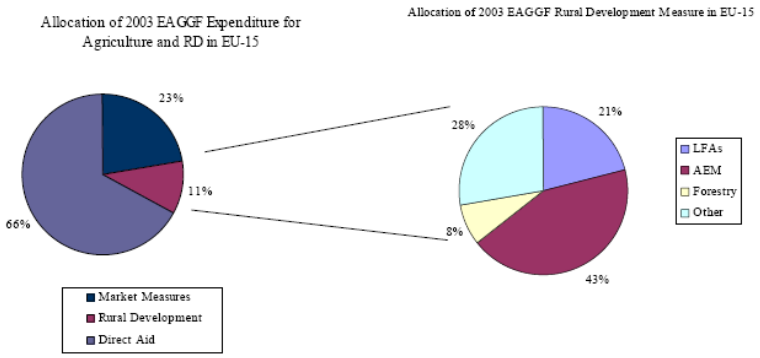
Brussels co-finances RDRs with member states at a maximum of 85 per cent for Objective 1 areas, and 60 per cent for Objective 2 areas, these maximums were increased in the 2003 reforms from 75 and 50 percent respectively (EC, 2006). Objective 1 areas are the economically poorer parts of the region (EC, 2006). Member states are at liberty to design RDRs as they wish, and to decide on levels of funding in accordance with their ranking of requirements, but they are constrained to include AEPs, which are the sole 'compulsory measure', reflecting the importance given to them by Brussels.[2] The variation in types and amount of expenditure among member states is very large, as shown in tables 1 and 2. It is also worth noting that member states with the most pressing agri-environmental problems, such as the Netherlands with the highest nutrient run-off in the EU, do not spend the most.

To summarise, AEPs are co-financed by Brussels as part of RDRs, which aim to revitalise rural economies and conserve the natural environment. Because of the wide range of values attached to such concepts, member states are free to choose the policy mix which best suits their particular requirements. Decisions in some countries are taken at the regional level, in line with the EU 'subsidiarity' concept, which requires decision-making at the lowest feasible level. This is in contrast to the CAP budget, which is decided at the EC level by representatives from the member states who, naturally enough, can be expected to lobby for their specific national interests. The key

[2] At the farmer level there is no cost-sharing, and all programmes are voluntary.

Figure 1. Allocations from the EAGGF (AEM's provide the legislative framework and EU funding for AEPs)

AEPs and the EU Budget



Source: European Commission, DG Budget (2004).

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Table 1: Types of AEPs by Member State in 2002

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). Shaded areas indicate policy adoption.

Table 2. Average Agriculture and Agri-environmental Expenditure by Country, 1992-2003 (million euro)

	Agri-environment	EAGGF	Agri-environment as % of total EU Agricultural Expenditure
Belgium and Luxembourg	8.9	1109	0.9
Denmark	9.7	1262	0.8
Germany	263.6	5363	5.7
Greece	6.1	2648	0.2
Spain	65.7	5137	1.2
France	145.27	9110	1.6
Ireland	82.2	1694	4.7
Italy	139.2	4669	2.9
Netherlands	8.6	1573	0.6
Austria	230.8	740	27.9
Portugal	53.4	696	7.4
Finland	118.3	516	21
Sweden	80.2	565	12.7
UK	46.5	3720	1.2

Source: EC, Eurostat and authors' calculations

goals for southern states are prevention of land abandonment and the retention of the rural population; this is why the early agri-environmental measures meant little to them. Northern states, which tend to be richer and less dependent on agriculture's contribution to GDP, place more emphasis on the 'lifestyle' and amenity value of the countryside. A consensus for the two groups would be to treat the problem of what to do with agriculture post decoupling as a 'stewardship' issue. In the next section we examine these concepts more fully, making use of our four 'lenses'.

European Agri-environmental Programs and the Four Lenses

We propose four hypothesized scenarios that may have given rise to AEPs: the first two represent the motivation to address externalities, and can therefore result from a motivation to improve welfare; whereas the last two imply that AEPs are a result of a political bargain that faces certain financial or trade constraints. There has been increasing concern about the negative externalities produced by the intensification of agriculture within Europe (Baldock et al., 2002; Pretty et al., 2001). Thus, one motivation for AEPs may be to limit the negative externalities of agriculture, such as nutrient run-off and loss of bird habitat; this is the 'pollution' lens. If AEPs are payments to limit the production of negative externalities, then they maybe welfare-improving.

When justifying its agri-environmental policy, the EU makes the argument that agriculture produces a number of public goods that have value to EU citizens. To ensure these goods are not underproduced, farmers need to be rewarded for the production of positive externalities, such as attractive rural scenery; this is our 'green consumer' lens. As much as these goods are truly externalities and demanded by citizens, a targeted program aimed at their delivery may also be welfare-improving.

Third, the EU has been forced by over-production and enlargement to reduce the agricultural budget, and it may be using AEPs as compensation to farmers who have lost production subsidies. This is our 'budget bargain' lens. Fourth, there is the 'cynical' lens that reflects the view that the United States is correct in suggesting that AEPs are merely converted price supports, and that nothing has really changed in Brussels. Both of these lenses represent a political bargain, and therefore do not imply a social optimum. Despite their similarity, there are substantive differences between the budget and the cynical lenses. In the case of the budget bargain lens, the AEPs are a result of the government trying to address the concerns of environmentalists and consumers while facing the joint constraints of the CAP budget and maintaining some support level for farmers. On the other hand, in the cynical lens, AEPs are purely a result of the agricultural lobby addressing constraints on agricultural subsidies imposed by the WTO. Thus, in the cynical lens, environmentalists and consumers have no (or little) influence in the outcome of agricultural policy.

Table 3 illustrates the form support for each lens would take in the econometric analysis of AEP uptake by member state. For example, if you were of a cynical mind and thought that the EU was using AEPs as converted price supports, then you would expect that green demand for cleaner water and greater biodiversity, for example, would not affect the uptake of AEPs; or, if the agricultural production supported by the CAP is inherently environmentally harmful, and these payments are intended to go to those same producers who received payments under the CAP, the payments may even be negatively correlated with pollution. Second, since the objective is to transfer income to producers, one would anticipate that rules that place constraints on payments (such as cross-compliance) would be negatively correlated with AEP expenditure.

The pollution lens: The negative externalities of agriculture are well-known in Europe, perhaps because for most Europeans farming is carried on within an hour's drive. Non-point source pollution of ground water, 'spray-drift', and the loss of hedgerows are widely discussed, especially after the foot and mouth, dioxin, and BSE crises. Several scholars, such as Jules Pretty, have published widely accessible books on the subject, drawing attention to the 'true costs' of intensive agriculture (Pretty, 1998; Pretty et al., 2000; Pretty et al., 2001). As a result of this attention, which is by no means restricted to northern states, reducing pollution has become a legitimate issue, although sometimes difficult for the EU to police. For example, the Nitrate Directive of 1991 has still not been fully enforced, and infringement proceedings are underway against some member states for lack of compliance (EC, 2006). Perhaps because of its relative weakness, the EU seems to prefer the carrot to the stick (Schramek et al., 1999), designing AEPs that reduce inputs and thus encourage beneficial outputs, rather

Table 3. Expected Correlation of Agri-environmental Payments with Observed Characteristics as Seen Through the Four Lenses

	Characteristics					
Lenses	Population Demand for Environment	Pre-Existing Pollution	Political Influence of Environ-mentalists	Cross-compliance	Political Influence of Agriculture	Group Receiving AEPs and Past Ag. Subsidies
Reducing Pollution	0	+	+	+	-	0
Green Demand	+	0	+	+	0/+	-
Budget Bargain	0/+	0/-	0/+	-	-	+
Cynical	0	-	-	-	+	+

than restrict harmful outputs directly. As can be seen in table 1, the EU does have some programs that address negative externalities, but these are often linked to encouraging farm processes that are seen to produce positive externalities as well. For example, organic farming is encouraged as a way of controlling nitrate leaching, instead of a program that pays producers to directly reduce nitrate leaching, regardless of the technique used. It is noteworthy that organic farming is, as indicated in table 1, the only measure common to all member states. The view through the pollution lens is therefore not clear; certainly the EU is reducing pollution by encouraging less intensive cultivation, but it is not possible to claim that this is the over-riding motivation behind AEPs.

The viewer through the pollution lens would not expect that AEPs were affected by green demand, exercised through for example rural tourism; that is, there may well be green demand, but the EU is not responding to this when designing AEPs. The same viewer would expect AEPs to be affected by agricultural pollution levels, indicated by variables such as pesticide use, nutrient run-off and also the intensity of production, given by farm size and equipment. Environmental influence is indicated in its national voting structure. This viewer would expect this set of variables to have an influence; AEPs would reduce pollution. The viewer would also expect cross-compliance to have an improving effect because of its compulsory nature and its constraint on virtually all producers, as discussed above. The same viewer might have a somewhat jaundiced view of the agricultural lobby, and regard the spread of AEPs as indicating a weakening of the agricultural lobby, indicated by variables such as number employed in agriculture. For similar reasons, ‘reducing pollution’ would expect a change in the claimant group, that is money is moving away from the producers who have previously received agricultural subsidies.

The green demand lens: The EU argues, on behalf of the green taxpayer, that non-marketed outputs will suffer if agricultural support prices are reduced by trade liberalisation without compensation for positive externalities. The EU position is supported by a variety of empirical evidence indicating Europeans genuinely value such environmental services (Drake, 1992; Hackl and Pruckner, 1997; Schmid et al., 2006). Surveys by Eurobarometer have shown a consistently high appreciation for the work of farmers in cultivating the landscape (EC, 2004). Allied to the wish to preserve scenic landscapes are those AEPs designed to lessen the abandonment of farmland in the EU. Land abandonment has been a particular concern for some southern member states, such as Spain and Portugal (Baldock et al., 1996) but also for northern member states such as Austria. Agri-tourism is a developing business and rural tourists in Europe prefer to see neatly cultivated land farmed under a low intensity regime (Hackl and Pruckner, 1997). Extensification is therefore encouraged, underlined by the Single Farm Payment scheme which subsidises farmers even if no crop is produced (EC, 2005). Farmers do however have to keep subsidised land in 'good agricultural condition' which means, for example, no afforestation (Schmid et al., 2006). The viewer through the green demand lens would expect, naturally enough, that green demand, expressed through for example domestic tourism and population density, would be positive; the EU is responding to expressed demand for environmental amenities, better facilities for bird-watching etc.

Both the pollution reducing and green demand lens imply that the AEPs may be welfare-improving for the EU. From a trade perspective, the primary concern would not be to limit these types of payments, but instead to ensure that they minimise any trade-distorting side-effects. For example, if by paying producers to expand the quantity of pasture, AEPs result in larger quantities of cattle produced, this might be of concern to trading partners. Further, the subsidized increase in the quantity of organics may decrease the premium faced by exporters of organic produce in other countries. Of particular concern may be those subsidies that pay for activities that producers would have taken in any case. However, if some of these externalities are difficult to target directly, requiring that countries focus exclusively on measurable environmental outputs, welfare may be reduced.

The budgetary lens: The EU has argued that one important reason for the original development of Pillar 2 was the combination of the high costs of production support under Pillar 1, and the continuing expansion of the EU (Fischer Boel, 2006). Thus, AEPs and RDRs potentially have been introduced as a politically feasible way to reduce price supports. Pillar 2, and hence AEPs, can thus be seen as a way for the EU to lower agricultural output and thereby reduce spending on production subsidies. The reduction of production subsidies is particularly important as the EU expands to 27 members, some of whom maintain large agricultural sectors. Decoupling is then a matter of reducing the CAP budget, but at the same time giving farmers some consolation in the form of AEPs. Although not necessarily geared to providing positive externalities, presumably the government would be interested in harnessing the support of green consumers for the CAP reforms. The viewer through the budgetary lens is expecting that environmentalists and consumers of the countryside, that is the first three

columns of Table 3, are expressing some influence, but would expect the AEP money to go to the same claimant group previously receiving CAP subsidies to smooth the transition.

The cynical lens: The cynical lens projects the view that AEPs are merely converted price supports, and that the EU has repackaged its production subsidies under another name in order to put them into the Green Box. The cynical viewer would therefore expect that green demand would have no influence.. You would however expect both the agricultural lobby and the same claimant group to have positive correlations. If you thought that AEPs were price supports by another name, then this money is flowing to the same groups that previously received price supports --reflecting the powerful influence of the agricultural lobby. Second, one would anticipate that the larger the past agricultural expenditure, the larger a proportional use of AEPs, to ensure that these producers are not being harmed by the switch from one tool to another.

Stakeholders in Agri-environmental Program Decision-making

The lenses can be thought of as reflecting varying levels of influence of different stakeholder groups. Table 1 indicates the wide diversity of AEPs within the EU; even countries which appear to have similar agricultural characteristics offer very different programs. Access to the political decision-making processes rather than natural endowments may therefore provide some insights into motivation and therefore potential future changes with effects on trade.

The various stakeholders whose cumulative influences lead each member state towards its own particular policy mix are: farmers; consumers, environmentalists; the non-farming rural population; taxpayers; and finally the central government. The relative access to decision-making and lobbying power of each stakeholder clearly varies between member states, and may help explain the differences in policy outcome. Keeler (1996) provides a good description of the continuing influence of the agricultural lobby in Brussels.

Hypotheses and the Econometric Model

As discussed above, an understanding of the motivations behind AEPs leads to the identification of the dominant policy-making group, and thereby the potential impact for trade agreements and Canadian trade. We now consider and explicitly test four hypotheses related to the supply and demand of AEP's:

(1) is it driven by the supply of negative externalities, (consistent with the pollution lens and the budget bargain lens);
(2) is it driven by the demand for positive externalities, (consistent with the green demand lens and the budget bargain lens);
(3) is it related to the amount of CAP subsidies from the previous year, (consistent with the budget bargain and cynical lens); and,

(4) is it affected by the political-institutional structure (consistent with the budget bargain and the cynical lens).

Our analysis uses three separate regressions by year by member-state, as shown in tables 5-7, using different dependent variables. Table 5 shows the results from a regression using AEP funding from Brussels as a share of total agricultural expenditure; in table 6 the dependent variable is total agricultural expenditure; and finally in table 7 the dependent variable is RDR funding as a share of total agricultural funding. The time-series is from 1993 to 2003 (excluding 1999 due to missing data on AEP expenditure for that year) against a range of variables that reflect preexisting pollution problems, consumer demand and agricultural characteristics. We have also included political variables, such as voting structure and the different political levels within member states at which funding is allocated to capture political infuence. 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 missing data (on farm size), Spain is effectively removed from the sample. However, when farm size is removed from the regression, the results remain virually unchanged. The percentage of agricultural expenditure going to AEPs was estimated using a panel regression with random effects, correcting for heteroskedasticity within the groups.[3]

To represent the supply of negative externalities from agricultural production, we include the amount of pesticides used (measured by kilograms of active ingredient) per hectare and the nitrogen surplus. We also include the percent of agricultural land that is in permanent pasture as a measure of the extensification of production. All of these variables are lagged to reflect pre-existing conditions and address concerns with endogeneity. If agri-environmental programs are indeed intended to reduce intensive farming practices, they will presumably be targeted at those regions with the highest degree of intensive agriculture. Population density is included to capture how sensitive the general population may be to agriculturally-produced pollution.

To proxy the demand for the positive externalities produced by agriculture, we use the amount of domestic tourism. We also include a ranking based on a report by the European Environmental Agency which graded European countries on their integration of environmental protection into domestic legislation and practice (EEA 2005). Scores from 1 to 5 indicate these results, with 5 being strongest.[4] Education of the population and access to information will also affect demand for environmental amenities. To capture this effect, we use access to the Internet in terms of number of

[3] (Heteroskedasticity was found to be a problem. Using a likelihood ratio test, we could reject homoskedasticity with a probability of 00.0, with a test statistic of 268.08 with 12 degrees of freedom). Panel specific autocorrelation was tested for, and the differences in the standard errors were found to be insignificant (the likelihood ratio test found that the hypothesis of no difference could not be rejected with a p-stat of 0.29)

[4] The EEA graded Denmark 'weak' but this seemed incorrect because before its conservative government Denmark had been considered a leader in environmental matters (Liefferink and Anderson, 1998). Thus, Denmark was ranked a 5.

connections per thousand inhabitants. Our data source is the World Bank. Unfortunately we are unable to separate rural from urban internet users. Last, we include GDP per capita to capture the effect of income.

A number of variables capture the political strength of the farm sector. The lagged CAP expenditure is included to provide the effect of past production subsidies. If agri-environmental expenditure is simply a means of delivering agricultural subsidies, those regions with the highest agricultural expenditure will convert a larger percentage of their direct subsidies to AEPs. To capture the overall size of the agricultural sector, we include the portion of the population that is working in agriculture. We also include the average farm size.

The relationship between AEPs and cross-compliance is captured by taking into account whether the member state had cross-compliance rules in place, thus requiring 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. On the other hand, cross-compliance rules indicate that the agricultural lobby was unable to block restrictions being placed on its other sources of funding.

Those rural residents who are not immediately involved in agriculture may not have the same preferences as their farming neighbours, so we also include the percent of the population living in the rural area. If these are recent migrants to the rural area and not reliant on agricultural prices for their income, they may want to see funds transferred from direct price supports to AEPs to reduce pollution and provide positive externalities. However, if they do rely on the agricultural sector for their livelihood, such as by working in the input or processing sector, they may be concerned with the reduction in purchased inputs and production that may result from this change in subsidies.

Last, we include a number of political variables, such as the percent of seats elected using proportional representation, and whether the Members of the European Parliament (MEPs) are elected by region or nationally. These variables are intended to capture the "voice" of the various lobby groups. The Proportional Representation (PR) system allows smaller parties, such as the Green Party, a voice. Therefore PR represents more of the influence of the environmental groups and less of the traditional lobbies, such as agriculture, which tend to be well represented by the traditional political parties. In contrast, regional voting would presumably strengthen the voice of geographic lobbies such as agricultural and rural interests. Summary statistics are presented in table 4.[5,6]

[5] The sources of the data are the EU (Eurostat), the FAO, the OECD, and the World Bank.
[6] We also included dummy variables representing various country groupings (for example, South versus North, Scandenavian), but they were not found to be significant.

Table 4. Summary Statistics for Variables used in the Regressions, 1993-2003

Variable	Obs	Mean	Std. Dev.
Agri-environmental programs as % of total agricultural Expenditure	134	5.71	8.97
Green Index (1=low, 5=high)	154	2.50	1.35
Domestic tourism (t-1)	119	4.91	3.09
Internet	150	1.65	1.63
Pesticide concentration (kgs AI per ha, t-1)	137	4.61	3.59
Nitrogen surplus (t-1)	137	74.09	62.17
Percentage permanent grassland (t-1)	150	17.82	13.22
Percentage of population that is rural (t-1)	140	23.97	12.58
Percentage of workforce in agriculture (t-1)	134	6.26	4.81
Population density (pop per km2)	140	147.20	115.29
Farm Size (t-1)	127	17.06	12.49
Cross compliance in place	154	0.57	0.50
CAP funding (t-1)	154	2.69	2.44
Percentage of MEPs elected using Proportional Representation	154	0.71	0.41
MEPs elected regionally (1) or nationally (0)	154	0.46	0.48
GDP per capita	154	20.72	6.53

Source: EC, FAO, OECD and authors' calculations. Excludes 1999 due to missing data.

Results

Overall, agri-environmental expenditure seemed to be negatively correlated with the pre-existing pollution, but positively correlated to demand (see regression results in table 5). Thus, countries with more intensive farming practices, whether that was represented by less permanent pasture, or a greater use of pesticides or nitrogen balance, spent less on agri-environmental measures than their more extensive counterparts. Thus, the countries that conceivably have the largest production of negative externalities are investing the least amount of money in changing their production. This result is consistent with the intuition that those farmers who lose the least productivity by adopting AEPs will be the most likely to adopt the programs. Thus, farmers with established intensive production technology are more reluctant to give up their comparative advantage (and price supports), while those farmers who are already farming extensively do not mind being funded to become more so. Those countries with higher population densities had a lower percentage of AEP expenditure. Thus, if there are fewer hectares per person, which might be thought to make pollution problems

more pressing (or at least more immediate), the lower the funding to decrease these problems.

Table 5. Regression Results Using Agri-environmental Program Expenditures as Percent of Total Agricultural Expenditures

Variable	Coefficient	Std. Error	p-stat
Green Index (1=low, 5=high)	2.58	0.87	0.00
Domestic tourism (t-1)	0.35	0.19	0.07
Internet	0.94	0.28	0.00
Pesticide concentration (kgs AI per ha, t-1)	-0.66	0.24	0.01
Nitrogen surplus (t-1)	-0.06	0.02	0.00
Percentage permanent grassland (t-1)	0.46	0.11	0.00
Percentage of population that is rural (t-1)	0.23	0.07	0.00
Percentage of workforce in agriculture (t-1)	-1.28	0.28	0.00
Population density (pop per km2)	-0.03	0.01	0.00
Farm Size (t-1)	-0.36	0.08	0.00
Cross compliance in place	-1.82	1.08	0.09
CAP funding (t-1)	0.38	0.26	0.14
Percentage of MEPs elected using Proportional Representation	20.30	5.02	0.00
MEPs elected regionally (1) or nationally (0)	0.19	2.31	0.93
GDP per capita	-0.19	0.14	0.17
Constant	-1.51	7.62	0.84
Log likelihood	-177.78		
Number of Observations	82		
Number of countries included	13		

If a country used cross-compliance, that country was more likely to spend a smaller percent of its agricultural budget on AEPs (although the coefficient was only significant at the ten percent level). Thus, those countries that imposed restrictions on CAP payments first were slower to adopt AEPs. Thus, it seems as if cross-compliance and AEPs were acting as substitutes rather than complements, with the implication that AEPs were not being used as a means to compensate producers for regulations.

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 more “environmental” the government, as measured by our constructed green index, discussed above, the greater the agri-environmental expenditure as a portion of total expenditure. Access to the Internet, a proxy for access

to information, was related to a greater portion of expenditure on AEPs. Last, 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 enjoys visiting rural areas. Further, the greater the population density, the lower the expenditure on AEPs. Thus, there is an indication that AEPs are not going to areas where many people may be affected by regional pollution, nor are they being used purely to block sprawl. The coefficient of GDP per capita was not significant.[7]

It is notable that while those countries with a larger portion of their population living in rural areas spent more of their agricultural funding on AEPs, those with a larger percentage of their population employed in agriculture spent less. This apparently contradictory result can be explained by noting that members of the rural population not involved with agriculture have an incentive to increase tourism and decrease the pollution associated with agriculture. However, people employed in agriculture are likely to benefit from commodity price supports, and may be concerned to see the transfer of funds from Pillar 1 to Pillar 2.

More predictably, those countries with smaller farms spent a higher portion of their agricultural expenditure on AEPs. 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 AEPs subsidise the use of traditional farming practices, which tend to require a greater labour to land input ratio, which often results in a smaller farmed acreage.

The results are inconclusive about the effect of historical agricultural expenditure on the degree of funding going to AEPs. Although the coefficient is positive, it is not significantly different from zero at the ten percent level. Along with the above results on farm size, there is evidence that those producers receiving AEPs are not the same as those who previously received CAP subsidies. Therefore, there is mixed evidence on whether the AEPs are explicitly being used as a substitute for agricultural subsidies.

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 smaller and newer parties such as the Green Party 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. Whether MEPs were elected regionally or only nationally seemed to have little effect.

It is interesting to contrast these results to a regression using total agricultural expenditure (table 6) as the dependent variable. Although CAP expenditures also seem correlated with some of the green demand variables (the green index and domestic

[7] GDP per capita and GDP per capita squared were both tried to see if there was a non-linear effect of income. However, the coefficients were individually and jointly insignificant at the five percent level.

tourism), those countries with more intensive farming (i.e. a greater use of pesticides and less permanent pasture) receive more CAP payments. The indication that demand for environmental services is correlated with higher CAP payments may indicate that the population perceives that some positive externalities are produced by agriculture. Not surprisingly however, CAP expenditure is higher in those countries with more intensive agriculture. Thus, it makes sense that those producers with intensive production technologies are reluctant to see funding transferred from CAP to AEPs, which promote extensive production.

Table 6. Regression Results Using Total Agricultural Expenditure

Variable	Coefficient	Std. Error	p-stat
Green Index (1=low, 5=high)	0.72	0.12	0.00
Domestic tourism (t-1)	0.19	0.03	0.00
Internet	-0.02	0.04	0.64
Pesticide concentration (kgs AI per ha, t-1)	0.08	0.04	0.06
Nitrogen surplus (t-1)	0.00	0.00	0.30
Percentage permanent grassland (t-1)	-0.11	0.02	0.00
Percentage of population that is rural (t-1)	0.00	0.01	0.58
Percentage of workforce in agriculture (t-1)	0.24	0.04	0.00
Population density (pop per km2)	0.01	0.00	0.00
Farm Size (t-1)	0.00	0.01	0.87
Cross compliance in place	-0.95	0.33	0.00
Percentage of MEPs elected using Proportional Representation	-6.54	0.76	0.00
MEPs elected regionally (1) or nationally (0)	1.19	0.28	0.00
GDP per capita	0.05	0.03	0.06
Constant	1.79	0.98	0.07
Log likelihood	-12.01		
Number of Observations	94		
Number of countries included	13		

This regression included controls for panel specific heteroskedasticity and panel specific autocorrelation.

The larger the rural population and the larger the portion of the population employed in agriculture, the larger the overall level of agricultural subsidies. As anticipated above, the EU's traditional price-supports may aid those employed in agriculture, who may therefore lobby for CAP payments. The broader rural population may also gain, albeit more indirectly, from agricultural subsidies. So, although the rural population may prefer AEPs, they may also demand CAP payments.

Here, proportional representation did seem to matter, in that if a country had PR, it tended to have lower agricultural subsidies. This result may indicate that the

traditional farm lobby has less influence under a PR system. Similarly, if a country has a system where MEPs are elected on a regional basis, they receive more agricultural subsidies than those that elect MEPs nationally. Thus, a regional system may allow the farm lobby more influence than direct national elections.

Last, a regression was run using the RDP payments as a percent of CAP expenditure to see if there was a difference in the RDP expenditure compared to the AEP component (see table 7 for results). Since we only have RDP expenditure data for 2000 to 2003, the regression for AEPs was re-run using this shorter time period (than the results reported in table 5), and the results are reported in table 7. Most of the coefficients in the two regressions had the same signs, implying that the pressure for AEPs is similar to that for RDPs in total.

Table 7. Regression Results Using Rural Development Program Expenditure as a Percent of Agricultural Funding, 2000-2003

Variable	Coefficient	Std. Error	p-stat
Green Index (1=low, 5=high)	7.76	1.24	0.00
Domestic tourism (t-1)	0.18	0.38	0.63
Internet	0.35	0.61	0.57
Pesticide concentration (kgs AI per ha, t-1)	-1.29	0.38	0.00
Nitrogen surplus (t-1)	0.03	0.02	0.17
Percentage permanent grassland (t-1)	0.82	0.14	0.00
Percentage of population that is rural (t-1)	-0.17	0.02	0.00
Percentage of workforce in agriculture (t-1)	-0.01	0.05	0.82
Population density (pop per km2)	-4.04	0.90	0.00
Farm Size (t-1)	-1.32	0.13	0.00
Cross compliance in place	8.62	1.66	0.00
CAP funding (t-1)	-0.03	0.40	0.94
Percentage of MEPs elected using Proportional Representation	26.13	5.49	0.00
MEPs elected regionally (1) or nationally (0)	-9.95	2.78	0.00
GDP per capita	-2.11	1.61	0.19
GDP per capita2	0.01	0.03	0.80
Constant	84.04	30.05	0.01
Log likelihood	-64.19		
Number of Observations	37		
Number of countries included	13		

This regression included controls for panel specific heteroskedasticity.

Much of the green demand had the same effect (although the coefficients on tourism and Internet were not significantly different from zero). Interestingly, the percentage of the population living in the rural area no longer had an effect. This

program is broad and directed at more aspects of rural development than agriculture, and so it is somewhat surprising that the relative size of the rural population had no influence. Also interesting is that the regional election of MEPs decreased the funding going to RDRs relative to that going to agriculture. Given that RDRs are there to aid certain (rural) regions, one might anticipate that regional representation would increase RDR funding. Thus, this result may indicate that the agricultural lobby is able to have more influence in the regional elections than the broader rural lobby.

Past CAP expenditure did not seem to affect the allocation of RDR funds, whereas in the last few years, those countries that were spending the most on CAP payments were also spending relatively more on AEPs. Due to the modulation that became mandatory in 2005, one might anticipate that those countries with the larger CAP budgets would spend a higher portion of their funding on Pillar 2 expenditures, whereas we see them only spending more on AEPs. GDP per capita did not have a significant effect, nor did GDP per capita squared, so the non-linear term was dropped from the final regression.

Summary and Conclusions

Below we summarize our results in terms of the four lenses we have used to illustrate possible motivations behind AEP provision. The pollution lens, which suggests that AEPs are being used to reduce the negative externalities of agriculture, gains little support. 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. Specifically, those countries with the highest agricultural chemical intensity are spending the least on agri-environmental measures. This result indicates that the largest potential gains of AEPs, in terms of reducing pollution, are being foregone

On the other hand, the green demand lens, representing demand for agriculture's positive externalities, does receive qualified support. Those member states that are the most “green” seem to be spending the most on AEPs (relative to their overall agricultural expenditure). Thus, the EU's contention that CAP reforms are being demand-driven may be at least partially true.

The third lens is 'budget bargaining', the hypothesis that AEPs are compensation to farmers for lost price supports. There is mixed evidence for this lens. The fact that green demand seems to have an effect is consistent with the idea that politicians are garnering support for agricultural reforms. One problem with this hypothesis however, is that much of green demand is also correlated with higher CAP payments, which would seem to imply that the attempt to garner support from these groups to reduce the CAP expenditures is not working. There is evidence that the AEPs are being used as subsidies, but the problem is that they do not seem to be going to those who previously received the most under the CAP.

Last, support for the U.S. belief that AEPs are farm subsidies in another guise is ambiguous. If this were true, one would expect that those areas with the largest agricultural subsidies would also have the largest AEPs. However it tends to be countries who receive smaller portions of the Pillar 1 of the CAP, such as Austria and Sweden, who are spending the most on AEPs. Thus, the AEPs are not serving as a substitute for price supports, and are instead creating a new group of claimants. Even though this finding diffuses the argument from other agricultural exporters, it does raise concerns for the EU, and its ability to use Pillar 2 payments as an incentive to reform the distortionary aspects of the CAP. Perhaps this is part of the reason that increasing modulation has been meet with resistance in some member states.

Although neither 'political' lens was unequivocally supported by our results, there is strong evidence that political structure is affecting the outcome of AEP expenditure. This result implies that AEPs (and RDPs more generally) are the result of a domestic political bargain, and not just a simple social welfare maximization. Therefore, when proposing constraints on agricultural subsidies through the WTO, the nature of this bargain must be considered. Specifically, the EU must be allowed the flexibility to give incentives to the various players if one is to get them to move (further) from the current subsidy regime.

An implication of our results is that green taxpayers are now having some influence over EU agricultural policy, possibly at the expense of the traditional agricultural lobby. For Canada, the relevance is that AEPs are unlikely to be reduced, and international pressure to limit their use may be counterproductive. Indeed, the reduction in production output and distortionary subsidies which AEPs appear to achieve are to be welcomed. It remains possible that the EU might expand the use of AEPs, and perhaps more likely, of RDPs. Should this occur, a suitable policy strategy might be to press for greater environmental targeting, for example greater site-specificity in payments. Second, it may be possible to direct more of the funding to producers who need larger incentives to improve their farming practices with the use of an auction process, a practice successfully used in the Conservation Reserve Program in the United States and begun now for some AEPs in Britain.

There is not overwhelming support for the cynical lens, but there is some indication that the agricultural lobby has lost a bit of its influence in setting the CAP agenda. If this is true, there may be room for further reforms in EU agricultural policy with the appropriate external leverage. That said, it seems as if budgetary concerns may have been a more pressing constraint than trade agreements.

In any case, AEPs and RDPs provide useful examples of non-price support to agriculture, and Canada would be well-served to understand their effect. Given the current ascendancy and growing power of the 'green demand' lobby means that AEPs are here to stay, and that a possible course for Canada might be to learn from them and apply (a modified form) of them wherever conditions are suitable.

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