Implementation of EU Agri-Environmental Measures at the Regional Level: Economic and Political Constraints

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Abstract

In this paper we apply a political objective function approach developed by Salhofer and Glebe (2004) to explain the high variability of agri-environmental program implementation at the EU regional level. The analysis covers 55 EU regions during the period 2001-2002, using basic data extracted from the *Common Monitoring Indicators* collected by the UE Commission for the programme's evaluation process. The main results indicate that the area covered by agri-environmental programs increases in regions where budget constraints are less severe and where the social demand for environmental amenities is more relevant. Moreover, agri-environmental programs are negatively related to the participation opportunity cost and show a non linear relation with the farmer's political weight.

Keywords: agri-environmental measures, CAP, regional and agricultural policy

JEL: Q18, Q24, Q28.

1. Introduction

The diversity of EU rural areas with regard to natural landscape, agricultural production systems and the capacity to retain, and attract, population is a matter of fact. As a consequence, most EU countries have implemented Rural Development Programmes (RDPs) at the regional level. Therefore regions, under national budget constraints, are key decision units in the implementation of rural development measures. For this reason, the most suitable level to analyse the uptake of EU RDPs is the regional one.

Agri-environmental commitments, the most important measures in terms of rural development budget expenditure (more than two billion Euro in the year 2000), have been implemented in every EU member State at both the national and regional levels. The regulations of these schemes - EC 2078/92 and measure F of EC 1257/99 - allow member states a wide margin of action, so the results of their application, particularly in terms of covered area, differ widely over the EU territory.

The purpose of this paper is to explain the high variability of agri-environmental program implementation at the regional level from a political economy perspective. The underlying idea is that the strong increase in agricultural funding channelled through agri-environmental programs in the EU reflect, at least partially, the fact that this programs are largely viewed as a trade-friendly way to transfer income to farmers, while at the same time responding to growing pressure from expanding social environmental concerns (see Baylis at al., 2004). Thus, politicians in choosing the optimal level of agri-environmental funds face a trade off between the welfare weight given to farm income, vis à vis that given to the public concern, under standard budget constraints.

We test this general prediction following the conceptual framework recently proposed by Salhofer K. and Glebe T. (2004). These authors have developed a model of countries' political objective function that identifies several determinants of the extent to which agri-environmental measures are implemented, such as environmental benefits, farmer participation opportunity costs, budget constraints, farmer political weight, and so on. However, we depart from these authors with respect to the level of application of the empirical analysis. In fact, instead of testing the model's prediction at

the member state level, we implement the model at the regional level, on the grounds that in most EU countries the RDPs are formulated and implemented by such institutional units.

The remainder of the paper is organised so that Section 2 presents a synthetic overview of the EU agri-environmental programs, focusing on the level of implementation at national or regional levels; Section 3 reports some theoretical remark; Section 4 describes the utilised data and the empirical specification, Section 5 discusses the main empirical results.

2. Agri-environmental measures in European regions

Agri-environmental measures are policy instruments targeted at development and support for more environmental-friendly agriculture methods and protection of the European countryside.

These measures include a series of schemes, generally farmer addressed, based on the reduction of agriculture impact on the environment (input reduction, organic farming, conversion of arable land to grassland, biodiversity, animal welfare, sustainable and extensive systems etc.) and rural land management (maintenance of the countryside and landscape features).

Farmers who join agri-environmental programmes for at least five years are supported by an annual payment, calculated on the basis of the foregone income and the additional costs resulting from the given commitment. The payment is based on the area of the holdings to which the commitment applies, under the constraint of a maximum premium per hectare fixed by legislation.

Obviously participation in such programs is voluntary, and payment is made for commitment that goes beyond usual 'good farm' practices. In this way the farmers are free to develop an environmental consciousness and strengthen their role in protecting the rural environment, and contribute to the maintenance of the attractiveness and viability of rural areas.

Agri-environmental measures began in some European countries in the '80s, but it was only in 1992 that the European Community introduced them as an "accompany measure" to CAP reform, with the objective of reducing intensive agriculture impact on the environment and improving environmental quality[1].

Since 1999 agri-environment schemes have been included by "Agenda 2000" CAP reform into Rural Development Policy, a unique framework in which the Community supports sustainable rural development. All Rural Development measures are incorporated in the RDPs that apply to all EU member states.

The agri-environmental schemes in the RDPs were drawn up for every European country, at the geographical level deemed to be the most appropriate[2]. Thus agri-environmental schemes can be tailored to different agronomic, environmental, political and economical situations.

Some states have implemented the schemes at the national level, while others produced regional programmes. At the former level we find France, Ireland, Sweden, Austria, Netherlands, Greece, Denmark and Luxembourg. Instead Germany, Italy, Belgium and the United Kingdom chose, in relation to their institutional differences, to apply the agri-environmental schemes regionally. Germany and Italy with their respective 16 *länder* and 21 regions worked out a programme for each, whereas the United Kingdom's 4 programmes are for England, Scotland, Wales and Northern Ireland; Belgium has 2 programmes, one for the Flemish Region and the other for the Walloon Region.

In a few cases, the states have simultaneously presented national and regional programmes for particular regions that prefer autonomy. This is the case of Spain with its national agri-environmental programme, with the exception of Navarra and the Basque Country that each have their own programmes, and of Finland and Portugal where there is a programme for the continental portion of the state and specific plans for the Aland Islands, and Madeira and the Azores Islands.

Over the whole EU-15, there has been the design of 59 RDPs involving agri-environmental schemes. It is important to note that the member states were obliged to provide for agri-environmental measures throughout their territories[3]. Thus agri-environmental measures are the only measures the member state or region must include in its rural development plan, all other measures are optional.

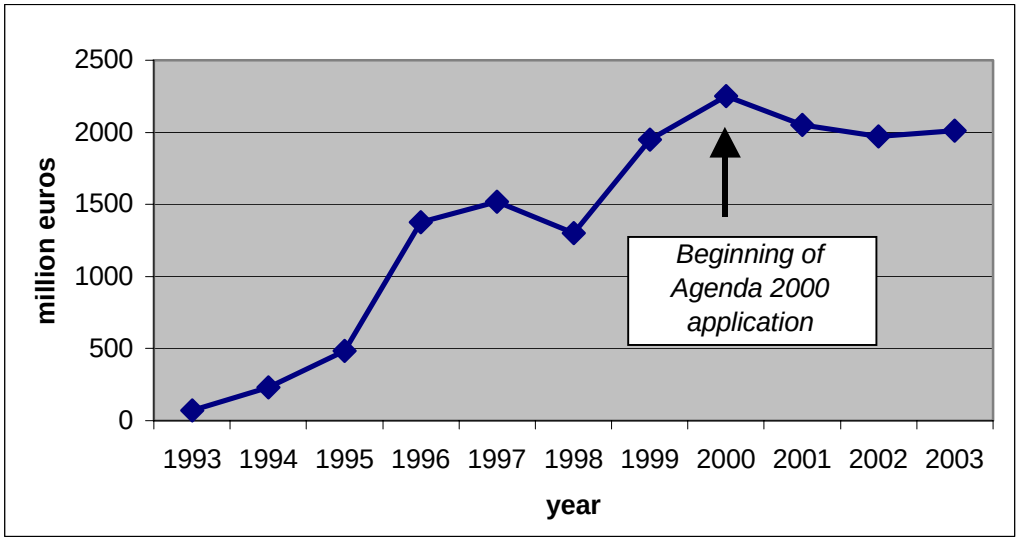
[1] Council Regulation (EEC) No 2078/92 of 30 June 1992
[2] Council Regulation (EEC) No 1257/99 of 17 May 1999 article 41
[3] Council Regulation (EEC) No 1257/99 of 17 May 1999 article 43

Agri-environment payment is co-financed by the EU and the member states. Until the 2003 Mid-Term Review the share from the EU budget was 75 % in Objective 1 areas (less developed regions) and 50 % in other areas, it is now respectively 85% and 60%.

In all the RDPs the agri-environmental measures, like the other 'accompanying measures', are co-financed by the EAGGF-Guarantee fund. The total financial resources allocated to agri-environment also comprises a national co-financed share and possible state aid.

The amount of EU budget spending on agri-environment measures is shown in Figure 1. After 2000 the amount includes the Agenda 2000 measures and old 2078/92 EC Regulation payments, started before 1999 (commitments are quinquennial). Note the slight fall that occurred at the beginning of the Rural Development Regulation due to its initial slow application.

Fig. 1: EU expenditure on agri-environmental measures (EC Regulations - 2078/92 and 1257/99)



Source: EAGGF-Guarantee section, budget execution.

The share of the EAGGF Guarantee Rural Development Budget covered by the agri-environmental measures varies significantly among the member states (see Figure 2).

Compared with the EU-15 'average share' of less than 50% of the EAGGF-Guarantee Rural Development budget dedicated to agri-environmental measures, we find Sweden with almost 90% and Austria and Italy[4] with more than 60% of the budget concentrated on agri-environment. Other countries like France, Belgium, the Netherlands and Spain show a share of 30% or less; the percentage of Greece is well under 10%. These data reflect, in addition to geographical and economical variables, the differing farmer attitude towards agri-environment among member states.

Besides budget share, it is also important to consider the quota of utilised agricultural area covered by agri-environment measures.

Also in this case wide differences are evident among the member states: Sweden, Luxembourg, Finland and Austria apply agri-environment extensively over a surface larger than 80% of the utilised agricultural area, whereas in the United Kingdom, Belgium, Denmark, Italy and Spain the share is between 10% and 15%. In France the share is 40%, while in Netherlands and Greece is under 5%. EU average is about 25%.[5]

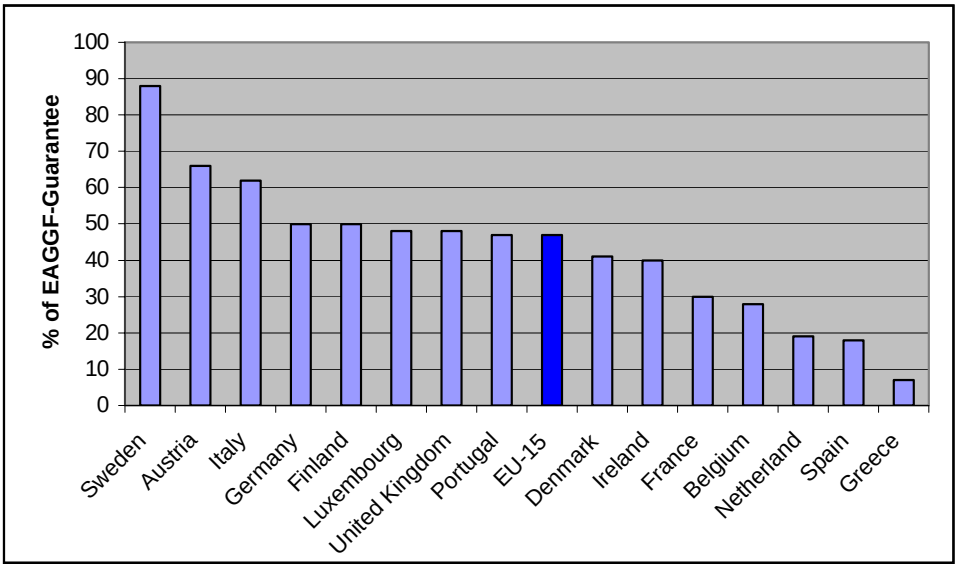
The average premium per hectare is different among EU member states (see Figure 3).

[4] Italy's percentage is influenced by many Objective1 areas which, as in other states, only accompany measures co-financed by the EAGGF-Guarantee fund, while other measures are co-financed by the EAGGF-Guidance fund.

[5] DG Agriculture, Common Indicators for monitoring Rural Development Programming 2002

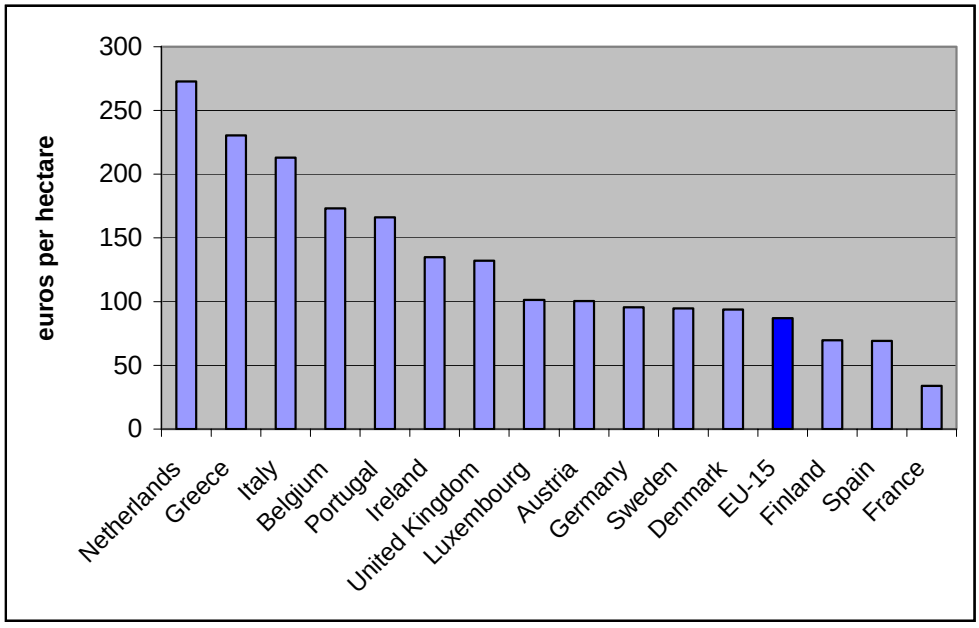
In France, Sweden, Austria and Finland the large surface of the scheme's application is offset by a small unit premium. On the other hand the Netherlands, Greece, Italy, Belgium and the United Kingdom have a higher premium per hectare. It is to be noted that maximum ceilings fixed by Rural Development Regulations apply with regard to the types of measures and crops.

Fig. 2: Share of agri-environmental measures in rural development expenditure (EAGGF-Guarantee section) – average 2000-2003



Source: EAGGF-Guarantee section, budget execution

Fig.3:Average premium per hectare (2001-2003)[6]



Source: DG Agriculture, Common Indicators for monitoring Rural Development Programming (years 2001,2002 and 2003)

[6] For Sweden we report the average premium 2001-2002

3. Theoretical remarks

This section gives a synthetic overview of the approach developed by Salhofer and Glebe (2004), also taking into consideration some recent developments in political economy models applied to the EU decision-making process. The starting point of the Salhofer and Glebe (hereafter S-G) model is the hypothesis that each EU member state tries to maximize national welfare instead of EU welfare, an assumption not so far from reality, at least in the context of agri-environmental policy where most contention tends to be country specific [7]. Thus, national welfare can be expressed by the well noted weighted linear welfare function:

$$W = U_N(D) + \delta U_F(D), \qquad (1)$$

where U_i is the welfare of the farmer (F) and non-farmer (N), while δ represents the weight the government attaches to farmer welfare. From a positive point of view, this objective function represents a reduced-form model called 'political preference function' where the political weight δ reflects rent-seeking ability (Bullock, 1994) or the political support (Swinnen, 1994) of the farmer group.

The comparative static results of the S-G model are obtained by maximising relation (1) subjected to economic and environmental constraints. In brief, economic constraint is modelled assuming that the slope, *b*, of the farmer's marginal private costs to participate in the agri-environmental scheme is constant.[8] Moreover, the marginal social benefit, *c*, of agri-environmental programs is assumed to be a constant. Then, under taxpayer budget constraints that take into consideration the co-financed nature of agri-environmental programs, and the national contribution *t* to the EU budget, the S-G model characterizes the optimal area, A^*, to be covered by agri-environmental programs.

Comparative static results show that the optimal area (A^*) is positively linked to the social benefit of the program (*c*), and the political weight government attaches to farm income (δ), being negatively linked to program participation costs (*b*), the economic and political costs of budget expenditure (λ) and the country's share in the EU budget (*t*).

The implementation of this theoretical framework at the regional level instead of the national, as in this study, offers one main advantage, apart from the reasons discussed in the previous section. The main advantages lie in the fact that the degree of freedom of the empirical model will increase significantly, giving the possibility of controlling for unobserved differences in the countries such as differences in political institutions. In fact, both theoretical and empirical evidence shows that political institutional factors strongly affect the political economy equilibrium (Henning, 2004; Olper and Raimondi, 2004). Thus, considering this last situation, the empirical model we estimate can be summarized as follows:

$$A^* = F(c, \delta, b, \lambda, t, z) \qquad (2)$$

where the variable *z* is a vector of country dummies to control for any unspecified country heterogeneity such as political institutions. Note that with country fixed effects included, any non-specified country differences, will be controlled for. Moreover, the inclusion of country fixed effects could control for the different RDPs territorial applications. In fact, the overlapping of territorial units of RDPs programmes and regions differ from state to state, sometimes coinciding with the regional border, sometimes comprising more than one region or even involving the whole nation.

[7] Generally speaking, this assumption is quite common in political economy application to the CAP. However, more recent tentatives to formalize the CAP decision making process progressively depart from this simplified assumption (see Henning, 2004; and Pokrivcak and Swinnen, 2004).

[8] The underlying logic is that rational farmers first allocate to agri-environment measures land with low productivity, and then land with high productivity. Thus, the marginal costs are increasing in allocated land under agri-environment measures.

4. Data and empirical specification

To explain the main economic and political constraints on the implementation of agri-environmental measures we use data from about 55 EU regions during the period 2001-2002. The basic data come from the EUROSTAT Regio database and *RDP common monitoring indicators* (CMI), collected by the EU Commission for the programme's evaluation process.

From all the 67 RDPs implemented in the EU during the considered period, our analysis covers all the 59 RDP containing agri-environmental measures. With regard to the time span the processed observations refer to the year 2001, the first year of CMI implementation, and to 2002. The lack of 2002 data reduced the number of total observations from 118 to 108.

The dependent variable (*A*) is extracted from the *CMI*. It measures the regional rate of implementation of agri-environmental schemes with regard to the area under the old commitments of EC 2078/92, plus the area under measure F of EC 1257/99. The rate of implementation of agri-environmental measure is expressed as a percentage of the utilised agricultural area plus forest surface, taken from EUROSTAT Regio database.

The main determinants of the extent to which agri-environmental measures are implemented refer to the farmers' income political weight, opportunity costs of participation, regional budget constraints, growth rate and environmental benefits.

The proxy of the farmers' political weight is based on the EU Commission publication 'Study on the impact of community agricultural policies on economic and social cohesion' (2000). Starting from these data we constructed a measure of farmer political weight (*agwtot*) using the total regional transfer to the agricultural sector (price support plus direct and other payments) as a share of the regional agricultural gross value added at basic prices.

Farmer adhesion to agri-environmental commitments involves a fall in their production linked to input reduction. This fall can be expressed as an opportunity cost, which is more consistent in the high productivity areas. Thus the yield of a common crop like wheat (soft and durum) is an adequate parameter to obtain a proxy of the farmers opportunity cost at the regional/national level (*yield*).

The 'regional contribution' to the whole EU budget is proxy by the share of regional GDP on EU15 GDP for the year 2001 and 2002. In order to smooth the strong regional/national size differences we express such variables in a logarithmic form (*budget*).

The regional/national budgetary pressure linked to the adhesion to agri-environmental measure is strictly related to the public budget deficit. Due to the lack of data on the regional deficits, the budgetary pressure variable is based on the regional growth rate (*growth*), expressed as the five year average before 2001 and 2002.

The environmental benefits, associated with the implementation of the agri-environmental measure (*beds*), is captured by the rate of beds in hotels and similar establishments per inhabitant.

However, because this variable only imperfectly captures the social demand for environmental goods, we also include in the empirical model the *per-capita* GDP (*gdppc*), on the grounds that social demand for environmental amenities is connected to economic welfare. Table (1) reports a statistics summary of the explanatory variable described above.

Thus, taking into account the variables described above, and the possibility of testing some second order approximations and interaction terms between variables, our preferred specification assumes the following form:

$$A_{it} = \alpha + z_m + \beta * agwtot_{it} + \beta_1 * agwtot_{it}^2 + \gamma * yield_{it} + \lambda * budget_{it} + \tau * growth_{it} + \mu * beds_{it} + \nu * gdppc_{it} + \varepsilon_{it} \quad (3)$$

where the subscript *i* and *t* refer to regions and years; α is a common intercept; z_m are country fixed effects; and finally β, β_1, γ, λ, τ, μ, ν are the unknown parameters to be estimated, while ε is an unobserved error term.

5. Results and discussion

Table 2 shows the ordinary least squares regressions of two different specifications based on equation (3). We begin the discussion from the results of Regression (1) that do not include the country' fixed effects. The model as a whole is significant, but explain a quite low level of the cross-region variation in the agri-environmental programs application (Adj R^2 = 0.22). However, all the explanatory variables, but one, are significant at 5% or 10% level. More specifically, in line with the Salhofer and Glebe's result, the area under agri-environmental programs is negatively related to the opportunity cost of program implementation (*yield*) and positive related to the demand of environmental benefits (*beds* and *gdppc*) and with the level of contribution to the EU budget (*budget*). Differently, the link between agri-environmental intensity and the political weight given to farmer's income is positive but not in a linear fashion: an increase in the farmer's political weight induce a less than proportional increase of area under agri-environmental programs.

An interesting question is now to understand what happens if we include country fixed effects to control for unobserved countries heterogeneity, such as institutions. This is shown in regression 2 of Table 2. With country fixed effects included, the explanatory power of the empirical model increase substantially (Adj R^2 = 0.50). This result suggests that the explanatory power of the unobserved effects is substantial. Furthermore, and most interesting, all the coefficients maintain their previous sign and are for the most part estimated with more precision (higher *t*-value). Finally, the coefficient of the *growth* variable albeit non significantly now have a positive sign in line with the *a*-priory expectation. Thus, overall, the results give credence to the Salhofer and Glebe's conceptual framework but, at the same time, call for a more formal treatment of country differences, here proxy by dummy variables.

Now let us turn to the interpretation of our empirical evidence. We start from the main deviation to the Salhofer and Glebe's results, namely the non linear link between the farmer political weight and the area covered by agri-environmental programs. Specifically, a positive coefficient in the linear term and a negative one in the square, suggests that in regions with a low level of farmer political weight, an increase in this variable induce an increase in the are under agri-environmental programs. However, this relationship turn out to be negative once a moderate amount of farmer political weight has been achieved. Thus, because the farmer political weight variable is proxy by the share of total regional CAP transfer to gross value added in agriculture, the non linear relationship simply tend to suggest that there is not a perfect spatial overlapping between traditional CAP transfers and the environmental measures. To simplify, the result tend to suggests that the redistributive effect of agri-environmental programs are only partially linked with the old CAP redistributive effects.

As in the Salhofer and Glebe's empirical analysis, the regional (national) contribution to the overall EU budget (*budget*) shows a different sign compared to the *a priori* expectation. The discrete number of observation (108) used in our analysis, compared to the 30 used in their study, suggest that the supposition that data limitation are driving their results, are not supported by our figure.

Thus, our empirical result seems to confirm the failure of the so-called 'restaurant table effect', namely the tendency of the CAP decision-making process to over protect agriculture, supporting the Pakrivcak, et al. (2001) model. However, note that because our *budget* proxy is measured at regional level, the link between regional GDP and EU budget is only indirect, so this conclusion has to keep with caution.

Areas under agri-environment commitment also vary in relation to the environmental benefit variables *beds* and *gdppc*, thus an increase in these proxy variables leads to an increase in the area covered by the schemes. Therefore agri-environmental measures can contribute to rural land management and can help maintain rural landscape features, in order to strengthen agricultural provision for non-trade goods and the landscape amenities more and more requested by the richest countries.

Finally the regional growth rate, as a proxy of extra cost for public funds, shows the right sign with direct proportionality between the agri-environmental area and the local growth rate. Nevertheless, the p-value is behind the conventional level of significance

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Table 1 - Summary statistics

Variable	Minimum	Mean	Maximum	St. Dev.
agwtot	0.035	0.461	1.401	0.258
agwtotsq	0.001	0.278	1.964	0.312
yield	0.800	5.152	9.800	2.282
budget(ln)	-3.677	-0.351	2.812	1.409
growth	0.005	0.037	0.116	0.019
beds	0.009	0.039	0.321	0.054
gdppc	9.458	23.231	51.949	7.749

Table 2 – Ordinary least square results

	regression 1		*regression 2*	
Variable	*coefficient*	*p-value*	*coefficient*	*p-value*
agwtot	93.10	0.0004	89.10	0.0000
	(3.69)		*(4.56)*	
agwtotsq	-56.71	0.0015	-57.02	0.0004
	(-3.26)		*(-3.68)*	
yield	-2.43	0.0343	-2.58	0.0370
	(-2.15)		*(-2.12)*	
budget(ln)	2.84	0.0655	2.17	0.0333
	(1.86)		*(2.16)*	
growth	-104.41	0.1603	363.31	0.1050
	(1.41)		*(1.64)*	
beds	87.76	0.0010	56.61	0.0000
	(3.38)		*(4.61)*	
gdppc	0.64	0.0773	0.67	0.0254
	(1.78)		*(2.27)*	
constant	-12.88	0.1673	-48.00	0.0037
	(-1.39)		*(-2.98)*	
National dummies	no		yes	
Obs	108		108	
Adj R-squared	0.22		0.50	
F-statistic	5.33		6.62	

Notes: White's robust *t*-statistics given in parentheses