DETERMINANTS OF PRIVATE AFFORESTATION IN THE REPUBLIC OF IRELAND

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Abstract

This paper employs a panel regression analysis using county-level data to quantify the relative importance of competing forestry and agricultural policy incentives in explaining trends in private afforestation in Ireland. It concludes that an increase in the level of up front payments to planters is the most cost efficient way of increasing planting levels. The introduction of the Irish agri-environment programme REPS has contributed to a significant decline in the level of forestry planting and offset the recent increases in the level of forestry grants and premia. Several policy reforms to encourage forestry planting in Ireland are proposed, including greater integration of forestry with the REPS scheme and increasing the value of the initial payment which farmers receive.

Keywords: Afforestation; Ireland

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1. Introduction

Ireland has shorter rotation periods for forestry than many other European countries yet, despite this, it is the least forested country within the EU. Since the 1940s, the Irish government has promoted afforestation with mixed success. Recent planting trends are shown in Figure 1. Throughout the 1980s afforestation rates remained low and most new planting was undertaken by the public sector. The rate of afforestation began to increase from the mid-1980s, driven largely by an increase in private afforestation. The upsurge in private forestry planting was mainly due to the introduction of a number of government incentives with support from the EU. The first such programme, the Western Package Scheme, was introduced in 1981 and provided forestry grants to farmers in disadvantaged areas largely in the western parts of the country. There was a relatively low take-up of this programme mainly because farmers faced a lack of income for the first 20 years after planting. A first attempt was made to address this problem in 1987 when these farmers who planted forestry were made eligible to receive cattle headage payments for a period of 15 years.

[Figure 1 about here]

However, it was the introduction of the Forest Premium Scheme in 1989 open to farmers in all parts of the country who planted forestry which first

attracted significant farmer interest. This scheme gave farmers annual payments for the first 15 years after planting conifers and 20 years after planting broadleaves. Figure 1 shows the sharp increase in the level of private afforestation in the early 1990s and the total annual area afforested reached almost 25,000 ha in 1995. On the basis of these achievements, the Government's 1996 afforestation plan set national planting targets of 20,000 ha per annum from 2001-2030 (Department of Agriculture, Food and Forestry, 1996). These targets were reaffirmed in the National Development Plan 2000-2006 (Department of Finance, 1999).

Since 1995, however, private forestry planting has declined sharply in spite of large increases in the level of forestry grants and premia. Public afforestation undertaken by Coillte, the forestry company which manages the state-owned forests, has virtually ceased. It now concentrates on reforestation of existing plantation areas and co-operative partnerships with the private sector. It is unlikely that Coillte will be involved in future land acquisition for public afforestation because public planting is no longer eligible for state grant and premia payments, as well as because of increasing land prices. The vast majority of forestry planting in Ireland is now carried out by farmers on land previously utilised for agriculture. Thus, the area planted to new forestry is sensitive not only to the level of forestry incentives but also to the competing incentives attached to agricultural production. Particularly in the latter period, there have been significant increases in the amount of direct payments to farmers related to farm production and agri-environment policies. The purpose of this paper is to

measure the strength of these competing influences on the level of private afforestation in Ireland over the past two decades. There is just one previous study which used time series regression analysis of aggregate national-level data to explain varying levels of Irish afforestation over time (Barrett and Trace, 1999). They found that the forestry premia had relatively limited influence on afforestation levels compared to agricultural subsidies and agri-environment payments. However, none of their explanatory variables were statistically significant at conventional levels of significance and the analysis suffered from the relatively short time series available using aggregate data.

This paper exploits the fact that forestry planting data are available at a county level (there are 26 counties in Ireland), and that both forestry subsidies and the strength of competing agricultural incentives vary across counties, to estimate a combined time-series and cross-section panel regression model, thus considerably increasing the number of observations and the robustness of the resulting estimates. The next section discusses the policy variables affecting afforestation levels in greater detail. Section 3 discusses the data and methodology used in the analysis. The main results are reported in Section 4, while the concluding section reviews the policy implications and conclusions that can be drawn.

2. Policy influences on private afforestation

Forestry Subsidisation

The two main policy incentives to promote private afforestation are a forestry planting grant and a forest premium. In addition, the Irish taxation system favours forestry as a land use and forestry receives a number of tax incentives and exemptions. Private forestry grants have been in place in Ireland since the 1920s and are generally paid in several instalments. The first payment is known as the planting grant, which covers the main planting expenses, and is paid on completion of planting. The subsequent grants, known as maintenance grants, are paid a specified number of years after planting occurs and are intended to cover the main costs of maintaining the forest in its early years. Grant rates were low in the early years, and the first significant increase took place in 1978 when the grant was increased from £86 to £222 per hectare (all amounts refer to Irish pounds). Under the Western Package Scheme from 1982, forestry grants up to a maximum of £800 per ha were paid to farmers in disadvantaged areas, while farmers in other areas were eligible for a forestry grant not exceeding £308 per ha. A unified scheme was introduced in 1991 which distinguished only between previously enclosed or unenclosed land and, since then, forestry grants have been regularly increased. In 2001, maximum grants for unenclosed land were £2,150 per ha, increasing to £3,900 for broadleaf trees (for oak and beech £5,000 and £5,300 respectively) (Teagasc, 1999). Because of the small-scale nature of farm forestry in Ireland and the lack of forestry

knowledge, it has been usual for planting to be undertaken by specialist companies in return for payment by the farmer to them of the planting grant.

As noted earlier, the Forest Premium Scheme under Council Regulation EEC 1609/89 replaced the more limited headage payment scheme in 1989 and, since then, all farmers have been eligible for annual payments. The conditions attached to these payments and the payment amounts have varied and been increased over time, distinguishing between the nature of the land planted to forestry and whether the farmer had off-farm income or not. The scheme was extended to non-farmers and companies in 1994 at reduced rates. The forestry schemes are financed 75 per cent from the EU FEOGA Guarantee Budget and 25 per cent from the Irish national budget (Gillmor, 1998).

Agricultural Subsidisation

Direct payments to farmers increased significantly in importance following the MacSharry CAP reform in 1993 and again following the Agenda 2000 reform in 1999. To the extent that these payments merely compensated for reductions in support prices, they did not alter the relative attractiveness of agricultural production *vis a vis* forestry. However, the addition of stocking density criteria to determine eligibility for compensatory payments, and the payment of an additional extensification premium where stocking densities

are further reduced, has increased the value of marginal agricultural land to farmers.[1]

The main payment scheme which has influenced levels of afforestation has been the Rural Environment Protection Scheme (REPS). This is the Irish implementation of the EU agri-environment Regulation 2078/1992 and has been in operation since 1994. Under this scheme farmers receive a basic premium of £119 per ha up to a maximum of 40 hectares, subject to a maximum of £4756 per annum (Department of Agriculture, Food and Rural Development, 2001a). By the end of 1999, 40,550 applicants and 1.6 million hectares of land, amounting to 33 per cent of total utilisable agricultural land, had been approved for REPS (Department of Agriculture, Food and Rural Development, 2000b; 2001a). The CAP Rural Development Plan 2000-2006 forecasts that 70,000 farmers, or half of the farming

[1] The extensification premium is payable to producers of suckler cows qualifying for the Suckler Cow Premium and male cattle qualifying for the Special Beef Premium (Department of Agriculture, Food and Rural Development, 2001b). The premium is paid to farmers who keep their livestock numbers under a set target per hectare. In order to obtain the extensification premium, the farmer must reduce his/her livestock units per hectare, either by reducing the number of livestock or alternatively by acquiring additional agricultural land. It was not possible to introduce the effect of the extensification premium directly into our regression model. However, as it has been estimated that up to 1 million hectares could be placed under forestry without reducing the available extensification premia or other farm income (Kearney and O'Connor, 1993), the omission of this variable from the analysis may be defended.

population, will have entered their land into REPS by 2006 (Department of Agriculture, Food and Rural Development, 2000a). Although there is no restriction on planting forestry on land entered into REPS, farmers cannot receive both REPS premia and forestry premia on the same land. This means that there is serious competition between forestry and REPS for land. REPS has the additional attraction for farmers in that land is enrolled only for a five-year period after which it can be withdrawn, unlike the decision to plant trees which is irreversible.[2] REPS thus enables farmers to postpone their decision to put land under forestry while still receiving annual payments.

The main purpose of our analysis is to try to quantify the relative importance of these policy factors in influencing the amount of land devoted to forestry. Specifically, we are interested in the strength of the competing subsidies paid to farmers for agricultural production and the provision of environmental services relative to forestry, as well as the relative importance of the forestry grant and forest premium in influencing farmers' decisions to plant.

[2] Currently, there is a legal requirement to replant forestry land, and planters replanting forestry are not entitled to a full planting grant or annual premia.

3. Data and Methodology

The afforestation regression model assumes that farmers weigh up the competing returns from forestry and agricultural production in deciding whether to plant trees or not. The forestry returns are composed of the net revenue from the sale of timber over the lifetime of the forest, the forestry grant and the forest premium. Agricultural returns are proxied by the gross margin obtained from cattle and sheep production, which are the most common enterprises found on the marginal land in Ireland most likely to be used for forestry. In addition, account is taken of the competing attraction of enrolling land in REPS.

In principle, the level of tax incentive would also be a relevant variable to include but previous analysis of private forestry in Northern Ireland did not find that tax incentives were a significant explanatory variable (Kula and McKillop, 1988; Kula, 1998). A possible explanation is that private forestry in Northern Ireland, as in the Republic, is dominated by small-scale planters who are unlikely to have significant tax liabilities. For this reason, taxation was not included as a separate variable in this regression analysis. The forestry land price is another variable which might influence the level of private forestry planted. However, values for this variable are not available at a county level.

Other non-quantifiable factors that influence the level of private forestry planted by a typical farmer include the level of risk associated with planting

forestry and cultural attitudes held by farmers towards forestry. These cultural attitudes have been identified as factors that may reduce the level of forestry planting in Ireland in recent surveys of Irish farmers' attitudes to planting trees (Gardiner and Ni Dhubhain, 1994; Frawley and Leavy, 1999; Clinch et al., 2000). In addition, there is evidence that these attitudes vary across counties. It is not possible to include these factors in this regression analysis, as these factors cannot be measured in a numerical manner. It is likely, however, if these are significant factors impeding private afforestation, then the negative impact of agricultural environmental schemes such as REPS which do not have risk or negative cultural attitudes associated with them will be even stronger.

Data and the Regression Model

The data sample covers the time period 1982-1999 for the twenty-six counties of the Republic of Ireland with the explanatory variables where appropriate expressed in 1999 constant prices. Data for 2000 became available after the analysis was completed and have been used as a test of the predictive ability of the model. The model to be estimated can be written as:

$$Priv_{it} = f(Formargin_{it}, Forplantgr_{it}, Forsub_{it}, Agrimargin_{it}, AreaREPS_{it}) \quad (1)$$

where

$Priv_{it}$ = the number of hectares planted with private forestry in county i in year t

$Formargin_{it}$ = the level of the expected forestry market margin achieved per hectare in county i in year t

$Forplantgr_{it}$ = the level of the forestry planting grant per hectare in county i in year t

$Forsub_{it}$ = the level of forestry subsidies per hectare in county i in year t

$Agrimargin_{it}$ = the agricultural gross margin per hectare in county i in year t

$AreaREPS_{it}$ = the area of land entered into REPS in hectares in county i in year t.

Panel Model Specification

The model is estimated as a fixed effects model in which planters in each county are assumed to respond in the same way to changes in the explanatory variables, but there are fixed (constant) differences in planting levels across counties due to unspecified county differences. The alternative panel model specification is a random effects model. Whether to treat the individual effects as fixed or random is not an easy question to answer and it can make a significant difference to the coefficient estimates especially if there are relatively few observations across time. The most appropriate methodology is often to judge this decision on 'the true nature' of these effects (Verbeek, 2000). The fixed effects model is appropriate if the cross-sectional terms are 'one of a kind' and cannot be viewed as a random draw from the underlying population. This is the case for this analysis where all the cross-sectional terms represent counties. However, diagnostic testing is carried out to determine the (un)suitability of the fixed effects model for this analysis. The model is estimated as the least square dummy variable

(LSDV) model by ordinary least squares (OLS) in which each county (except one) is represented by a dummy variable. A log-log regression model is used, as this is consistent with previous regression analysis in this area and because of the significant differences in the absolute values of the independent variables in levels. Thus the coefficient estimates can be interpreted as elasticities.

The Level of Private Forestry Planting

Data on private afforestation by county was obtained from the Forest Service's *Forestry Statistics 1999* (Forest Service, 1999). Because there was no private planting in some counties in the early years of the sample period, to avoid the problem of taking the log of a zero number it was assumed that a hundredth of a hectare was planted in each county where no planting took place in the years 1982-1988.

The Expected Forestry Market Margin

The net returns from timber production (called here the forestry market margin) are based on the difference between timber revenue and costs. There are two main sources of revenue from timber production, namely, thinnings and clearcutting revenue. When planting, a farmer must anticipate the likely timber price in the future over the rotation period. The assumption is made that the farmer's price expectation is determined by the average of the current year's and previous four years' prices. This assumption can be defended as long-range forecasts for timber prices suggest that they will remain constant in real terms (Clinch, 1999). Revenue depends on the

species planted, the average yield class per county, the timber price, the number of trees per hectare and the average volume of timber per tree.[3] The costs include establishment costs, fencing, brashing, road and drain repairs, road construction and maintenance costs as well as the costs of marking and measuring the trees for thinning. Although revenue differs across counties depending on the average yield class achievable in each county, it was assumed that costs would not differ across yield classes.[4] The forestry market margin between the year of planting 0 and the year of clearcutting n is expressed in Net Present Value (NPV) terms by discounting by 5 per cent. A 5 per cent discount rate is chosen to represent the long-term opportunity cost to private individuals of putting money into forestry in Ireland and it is also the discount rate used to assess government policy proposals.

$$\text{NPV of the forestry market margin} = \sum_{i=0}^{n} \frac{R_i - C_i}{(1+.05)^i} \qquad (2)$$

To make the forestry market margin more comparable with the agricultural gross margin, the NPV is expressed as an annual annuity of 5 per cent in the

[3] Thinning is the cutting out of selected trees from a plantation to improve the growth and quality of the remaining trees (Kula, 1988). The yield class of a tree is a measure of the quantity of the timber produced from a stand of a tree as a function of time (Clinch, 1999). It is assumed that Sitka Spruce is planted as this is still the most popular species planted in Ireland.

[4] County yield classes were calculated for Sitka Spruce from data provided directly by Coillte.

regression analysis and this is known as the expected forestry market margin.

The Forestry Planting Grant

The forestry planting grant is paid by the government to planters to cover plantation and establishment costs. It is 75 per cent of the total forestry grant and is paid on the completion of planting. For the period 1982-1990 planting grants differed across counties depending on whether the land afforested was classified as a disadvantaged area or a non-disadvantaged area under the EU Less Favoured Areas Directive 85/350. Farmers and non-farmers who planted forestry in areas classified as disadvantaged were eligible to receive grants under the more generous Western Package Scheme. In 1991, a new overall scheme was introduced for all counties in which the new levels of forestry planting grants just depended on whether the land planted was previously enclosed or unenclosed. The Forest Service's *Forestry Statistics* provide data on the percentages of total forestry that is planted on enclosed and unenclosed land at a county level in Ireland. It was assumed that these percentages also applied to private planting and, on this basis, it was possible to calculate county-specific planting grants for the period 1991-1999 depending on the percentage planted on enclosed or unenclosed land.

Forestry Subsidies

Forestry subsidies are defined as the combination of forestry maintenance grants and forest premia payments (or compensatory headage payments in

the early years of the sample period). Maintenance grants are paid a specified number of years after planting occurs. Since the introduction of the Western Package Scheme maintenance grants have been 25 per cent of total forestry grants paid to planters. Headage payments paid in the period 1987-1989 were only paid in counties classified as disadvantaged.[5] Forest premia payments differ by county in the period 1990-1993 depending on the proportions of enclosed and unenclosed land in each county, and after 1994 depending on the classification of the area in each county as more severely handicapped, less severely handicapped or non-disadvantaged land under the Less Favoured Areas Directive. The premium associated with the majority classification was assigned to each county. The current levels of premia were introduced in late 1999. At this time the eligibility criteria were altered so that the premia no longer differed across soil classifications. The NPV of forestry subsidies over the rotation period was calculated using the discount rate of 5 per cent.

The Agricultural Gross Margin

The agricultural gross margin used is a county-specific weighted gross margin of different sheep and beef farming systems, as these are the two main agricultural enterprises competing with forestry in Ireland. The weighting of the gross margins depends on the farming systems which are

[5] This land was marginal agricultural which had to be classified as disadvantaged under the EEC Directive 85/350.

most prevalent in each county. Data were provided from the FAPRI-Ireland model database maintained by Teagasc.[6]

The Area Entered into REPS

The area entered into REPS is included as a separate variable using the annual area of land entered into REPS at a county level for the years 1994-1999.[7] The means and standard deviations for the variables used in the analysis are shown in Table 1.[8]

[Table 1 about here]

[6] Data provided by private communication by Julian Binfield, Rural Economy Research Centre, Teagasc.

[7] It was not possible to use Department of Agriculture statistics on payments to REPS farmers by county for this purpose. The Department does not calculate the annual area of land entered into REPS at a county level but the annual area of land on which REPS subsidies are paid. Because REPS payments may be paid more than once in a year and because of delays between enrolling land and receiving payments, the subsidy data are an unreliable measure of the annual amount of land enrolled in REPS. Instead, Department data on the cumulative amount of land in each county enrolled in REPS each year was used in conjunction with the annual percentage changes in the national amount of land enrolled annually in REPS to derive county-specific estimates of the amount of land entered into REPS each year.

[8] All the means and standard deviations of the variables used for this regression analysis are calculated over the period 1982-1999, with the exception of the area entered into REPS. Its mean and standard deviation are calculated over the period 1994-1999 as REPS was only introduced in 1994.

4. Discussion of results

Diagnostic Testing

The regression results are shown in Table 2. The validity of the fixed effects specification was tested using a Hausmann Test. The null hypothesis of no correlation between the individual effects and the explanatory variables was rejected at a 5 per cent significance level, indicating support for the fixed effects specification. Diagnostic testing for the presence of autocorrelation or heteroscedasticity in the residuals was carried out using Lagrange Multiplier tests. While the presence of autocorrelation was rejected, heteroscedasticity could not be and, to take account of this, White's robust standard errors were used. In terms of goodness of fit, the overall R^2 and within R^2 for this model would seem to suggest a reasonable representation of the underlying data. All the variables have their expected signs and the p-value associated with the F-statistic, which measures the probability of all the coefficients being simultaneously zero, is zero.

[Table 2 about here]

Statistical Significance of Results

Four variables are shown to be statistically significant in explaining private afforestation at a 1 per cent significance level: the forestry planting grant, forestry subsidies, the expected forestry market margin and the area entered into REPS.

The agricultural gross margin, though appearing with the expected sign, was not found to be a statistically significant explanatory factor. This is not an unexpected result as the higher level of forestry planting in the early 1990s, when taken in conjunction with the upward trend in livestock units, indicates that overall competition between forestry and agriculture did not prove to be very restrictive at least up to and including 1995 (Kearney, 2001). The recent developments in both sectors imply greater use being made of previously under-utilised or waste land resources (Kearney, 2001). Increasingly, as the standards for plantable land are raised, as other possible areas are precluded from forestry on environmental grounds, and less marginal land remains available, the competition for land between agriculture and forestry will intensify (Kearney, 1999).

The Forestry Planting Grant and Subsidies

To explain the results, the example of the forestry planting grant can be taken. This variable's coefficient is 2.83 which means that a 1 per cent increase in the level of forestry planting grant calculated at the sample mean would lead to a 2.83 per cent increase in the level of private afforestation. This value can be converted into a marginal effect, measuring the response to a unit increase in the planting grant. This is done by dividing the elasticity by the ratio of the means of the dependent variable and the independent variable.[9] Because the dependent variable is the annual planting by county,

[9] For the purpose of the results reported in Table 3, the time period is restricted to 1994-1999 in order to be consistent across all variables, as the Area under REPS variable only

to convert this to a national figure it is multiplied by 26. The marginal effect of the forestry planting grant is 25.75, which is interpreted to mean that every £1 increase in the value of the forestry planting grant leads to a 25.75 hectare increase in the national annual level of private afforestation (see Table 3).

[Table 3 about here]

The marginal effect of forestry subsidies is 11.63, meaning that every £1 increase in the NPV of these subsidies leads to a further 11.63 hectares of forestry at a national level. The marginal effect for the forestry planting grant is 2.2 times the marginal effect for the expected forestry margin for equivalent changes in expenditure measured in net present value terms. [10]

These are the appropriate figures for making comparisons with the afforestation effect of equivalent government expenditure on planting grants and forestry subsidies, but it is not so easy to interpret in policy terms. Policy-makers think in terms of the effect of a £1 increase in the planting grant relative to a £1 increase in annual forest premium payment, but because the latter is paid over a number of years, this is not comparing like

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exists for this time period. However, for the other variables the reported values differ little from those calculated using the entire sample period.

[10] For the purpose of calculating the marginal effects with respect to a unit change in the forestry market margin NPV, the estimated coefficient which refers to the annuity equivalent is multiplied by 20.

with like. By noting that the NPV of a £1 increase in the annual forestry premium paid over 20 years is £13.09, it is easy to calculate that the national increase in afforestation as a result of a £1 increase in the annual forestry premium is 11.63 x 13.09 or 152.24 hectares. This is clearly a larger effect than would be achieved by increasing the planting grant by £1. However, in order to increase private afforestation by the same amount the forestry planting grant would just need to be increased by £5.91, which is less than half the NPV of the government outlay on the forest premium. Increasing the forestry planting grant is a more cost effective method of increasing the level of private forestry planted than increasing the annual forestry premia from the state's point of view. Note that this is a marginal effect taking the existing mix of planting grant and premia as given. It does not overturn the historical evidence that little private planting took place before farmers became entitled to some form of annual premium payment.

The Expected Forestry Market Margin

The marginal effect of the expected forestry market margin is also positive but, at just over 2 hectares for every £1 increase in the annual annuity, its economic significance (as opposed to its statistical significance) is very limited. For example, an increase of 1948 per cent on 1999 levels in this margin would be needed to increase private afforestation significantly from 1999 planting levels in order to meet the government's planting target. Most forestry experts concur that the vast majority of farmers do not consider the forestry market margin when deciding whether to plant their land. Farmers appear to consider only the payments of forestry grants and premia for the

next twenty years rather than the final timber revenue which will not be received for at least 40 years.

The Area Entered into REPS

Finally, the marginal effect of land entered into REPS is interpreted to mean that for every hectare of land enrolled in REPS that there will be a 0.02 hectare decrease in the level of private afforestion. The annual average area entered into REPS in the period between 1994-1999 was 266,667 hectares. Taken together with the size of the calculated marginal effect, this would suggest a reduction in the level of private forestry planted by 5,333 hectares on average per annum due to this policy. The introduction of REPS has been one of the main factors that has led to the decline in the level of private forestry planting in recent years. This effect is in part due to the sheer volume of land entering into REPS and the decreasing stock of marginal land available for other uses. The introduction of REPS explains the ineffectual nature of recent increases in the level of forestry premia and grants.

Although the most recent grant and premia increases in late 1999 were not included in the regression analysis, these increases can be used in an attempt to predict the level of private forestry planting in 2000. These increases are estimated to lead to an extra 19,365 hectares of private forestry planting in 2000, *ceteris paribus*. In the year 2000, however, 466,000 hectares of land were entered into REPS which is estimated to lead to a decline of 9,320 hectares in the level of private forestry planting. Overall, the model

estimates that, in 2000, private forestry planting should have increased by approximately 10,045 hectares. The actual figure was 2,454 hectares. Therefore, it seems that this regression model over-projects the level of private forestry planting in Ireland for the year 2000. However, the increases that took place were very significant and occurred very late in 1999 and therefore it is likely that there will be a lagged response to these increases from farmers due to information and time lags.[11]

5. Policy Implications and Conclusions

This paper has identified the factors influencing the level of private forestry planting in Ireland. These factors are the forestry planting grant, the level of forestry subsidies, the expected forestry market margin and the area entered into REPS. If the national afforestation target of 20,000 ha is to be met, then changes in one or more of these variables will be necessary. Although this paper suggests methods of increasing the level of forestry planting in Ireland in order to meet this target, it should be noted that an examination of whether this target is the optimal level of forestry planting is beyond the scope of this paper.[12]

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[11] Lags were not introduced into this regression model due to time series data limitations.

[12] This paper has not discussed whether there are net economic or environmental benefits to planting additional forestry in Ireland. It would be necessary to review both the positive and negative environmental and economic effects of planting forestry in order to ascertain the optimal level of forestry planting in Ireland. See Clinch (1999) for a discussion of this issue.

Relative Significance of the Expected Forestry Market Margin

The marginal effects of the forestry planting grant and forestry subsidies variables in comparison to the expected forestry market margin variable confirms the necessity of state support for the private forestry sector if the forest area is to increase. It seems clear from this analysis that increases in the forestry market margin alone would not substantially increase the level of private forestry planting.

Forestry Subsidies vs the Forestry Planting Grant

The panel regression analysis suggests that, although increasing the forestry annual premium payment by £1 will be nearly six times as effective as a £1 increase in the forestry planting grant, the most cost efficient method of increasing private forestry planting in Ireland is to increase the forestry planting grant when both incentives are compared in terms of their NPV cost to the state. This might be seen as a counter-intuitive finding, given that farmers in the past often simply passed on the grant to the planting contractor. However, there are at least two ways in which higher planting grants tended to stimulate higher levels of private planting. First, with higher grants, contractors would have had a greater incentive to seek out farmers to encourage them to sign up for the scheme. Second, in some cases farmers retained a portion of the grant through supplying their own labour or other services to the contractor.

It is evident from this regression analysis that upfront payments paid in the early years of planting may be both a persuasive and cost efficient method

of increasing the level of private forestry planting. This is because the planter receives the payments immediately and they do not suffer from any risk of changes in government policy or from devaluation due to inflation. Since the most recent increase in forestry grants in late 1999, grant payments are now related entirely to the actual costs incurred. Therefore, increasing forestry planting grant payments cannot be pursued as an incentive measure in order to increase the level of forestry planting in Ireland. Tiering the premium payments over time so that a higher proportion of their value was paid in the earlier years would have a similar effect, although this may conflict with the income maintenance objective of these payments.

The growth of private afforestation and ever increasing land prices contributed to Coillte changing its focus from purely public forestry to partnership with the private forestry sector in Ireland. This partnership materialised in a number of schemes including Coillte's Farm Partnership Scheme and the Private Forestry Scheme. The Farm Partnership Scheme was introduced in 1992 and has proven particularly popular. On entering the Farm Partnership Scheme the landowner receives an up front payment of currently £500 per hectare and tax-free income throughout the rotation of the forest. The landowner continues to receive the applicable forestry premia for 20 or 15 years depending on whether the owner is a farmer or a non-farmer. The landowner receives 80 per cent of the thinning profits and this amount, known as the thinning annuity, is paid annually from the year the premia cease until clearfell. The landowner also receives 55 per cent of

the clearfell profits. The landowner retains full ownership of the land but Coillte provides the necessary management and marketing skills (Coillte, 2001). Our results suggest that modifications to the scheme which would increase further the value of the initial payment to the farmer in return for a smaller share of the clearfell profits would enhance its attractiveness to potential participants.

The Integration of REPS into Current Forestry Policy

The analysis suggests that the introduction of REPS is one of the main reasons for the decline in the level of private forestry planting in recent years. It is essential, therefore, to integrate the current afforestation programme and REPS in order to increase the level of private forestry planting.

The CAP Rural Development Plan 2000-2006 stated that all areas suitable for afforestation on applicant sites for REPS must be reported to the Forest Service (Department of Agriculture, Food and Rural Development, 2000a). This policy of active identification of potential forestry sites to the landowner will itself encourage increased planting. Linkage would be further strengthened if REPS payments were withheld on this land so that the only way open to farmers to claim premia on eligible land would be to plant it with forestry. It is unlikely the EU would permit a cross-linkage between schemes in this way as it would deny farmers the right to receive an environmental payment even though they were farming that land in accordance with the scheme conditions. An alternative approach would be

to allow the land planted with forestry to be eligible for both the forest premium and REPS payments. This would only be justified, however, if the forest management produced environmental benefits over and above those which might be expected from normal good forestry management practice.[13]

In conclusion, this paper has established that an increase in the level of the initial payments to planters is the most cost efficient method of increasing the level of forestry planting in Ireland. It was found that the introduction of REPS has led to a severe decline in the level of forestry planting in Ireland. This paper suggests several policy reforms to increase the level of forestry planting in Ireland, including increasing up front payments and reform of REPS to encourage better integration with forestry.

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[13] Payments to farmers under REPS are justified for environmental benefits which arise from managing land use and farm practices which go beyond those associated with normal good farming practice (Department of Agriculture, Food and Rural Development, 2000a).

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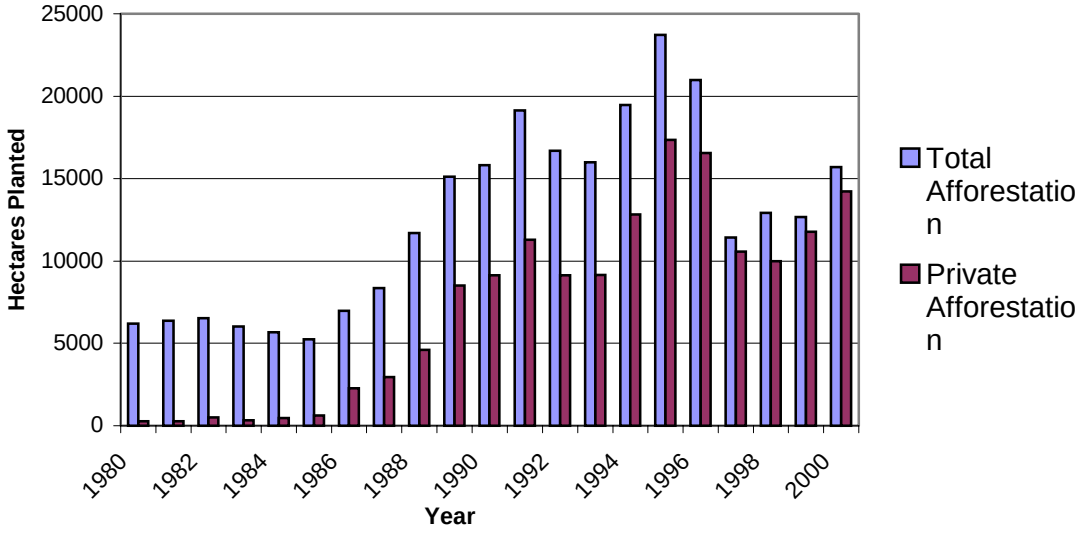
Figures

Figure 1. The Levels of Total and Private Afforestation in the Period 1980-2000



Source: Forest Service (1999), Kearney (2001).

Tables

Table 1. The Means and Standard Deviations of the Variables Used in the Regression Analysis

Variables	Units	Average	Standard Deviation
Level of Private Afforestation Planted	Hectares	293.63	380.29
Forestry Market Margin	5% of Net Present Value in 1999 prices per ha	107.05	67.82
Forestry Planting Grant	£ in 1999 prices per hectare	838.92	330.71
Forestry Subsidies	Net Present Value in 1999 prices per ha	1394.36	1165.52
Area Entered into REPS	Hectares	9772.89	9407.33
Agricultural Gross Margin	£ in 1999 prices per hectare	457.83	119.90

Note: All these variables are the averages of county level data at an annual level

Table 2. Panel Regression Estimates for Private Afforestation

Variables	Units	Coefficient	Robust Std Error	t-Stat	P Value
Constant		-33.09	3.75	-8.83	0.00
Forestry Planting Grant	£ in 1999 prices per hectare	2.83	0.36	7.88	0.00
Forestry Subsidies	Net Present Value in 1999 prices per ha	2.12	0.17	12.47	0.00
Forestry Market Margin	5% of Net Present Value in 1999 prices per ha	0.03	0.007	4.15	0.00
Agricultural Gross Margin	£ in 1999 prices per hectare	-0.01	0.53	-0.01	0.99
Area Entered into REPS	Hectares	-0.02	0.002	-10.57	0.00
R^2 (overall)	0.82				
R^2 (within)[14]	0.55				

Note: Dependent variable: Private Afforestation on a County Level (ha) per annum in logs

[14] Not adjusted for robust standard errors, due to the way Stata calculates this measure of within variation.

Table 3. Marginal Effects at the national level

Variables	Units	Marginal effect of a one unit increase in the independent variable
Forestry Planting Grant	£ in 1999 prices per hectare	25.75
Forestry Subsidies	Net Present Value in 1999 prices per ha	11.63
Forestry Market Margin	5% of Net Present Value in 1999 prices per ha	2.11
Area Entered into REPS	Hectares	-0.02