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# Modelling the economics of forestry in Ireland (FIRMEC)

## Key external stakeholders:

Forest service, Department of Agriculture, Food and the Marine, farmers interested in planting forests, other land-owners seeking to invest in forestry.

## Practical implications for stakeholders:

Forestry has the potential to meet many of the goals of national and EU policies for sustainable rural development.

- Many Irish farmers would benefit financially from planting some land with commercial forestry - cattle farmers would benefit most.
- Larger farms and those in less-intensive farm systems were more likely to enter into forestry during the period 1995-2009.
- A comprehensive valuation tool for forestry in Ireland was developed as part of this project.
- A negative attitude towards forestry still exists amongst some farmers and may be a barrier to planting.
- Soil quality plays an important role in the economics of land-conversion.
- Land availability is likely to be an important factor in reaching afforestation goals.
- The Irish public value forest recreation and other non-market forest benefits and travel cost valuation methods offer a way to capture this value.

## Main results:

The MS Excel based Forest Investment and Valuation Estimator (FIVE) is the most comprehensive forest valuation tool developed for Ireland. Using the FIVE it is shown that forestry is a financially competitive land-use option for many farmers in Ireland. Farmer's willingness to plant and the barriers to planting were investigated using a number of surveys. A number of policy and farm related drivers are identified but a negative attitude towards forestry still exists amongst some farmers. A spatial model of land-conversion to forestry was developed which identifies the most important drivers of land-use change and has the potential to identify where future change will occur. In addition, forest non-market benefits are reviewed and recreation visits are valued employing a travel cost study.

## Opportunity/Benefit:

The FIVE offers the best available forest valuation tool in Ireland and is employed by Teagasc forestry advisors and private sector foresters when interacting with farmers. This facilitates the detailed measurement of the financial implications of converting agricultural land to forestry. Future demands for advisory services



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can be identified with the spatial afforestation model. The results of the project have been outlined in a number of peer-reviewed and published academic papers and working papers.

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## 1. Project background:

Farmers have undertaken 90% of afforestation in the last 20 years and are identified as the primary source of planting in the future. Converting agricultural land to forestry can result in an increase in non-market benefits, in addition to being financially beneficial to land-owners, and is thus viewed as contributing to sustainable rural development. The financial implications of planting depend on a number of factors and although it has been recognised that forestry may be a competitive land-use option for farmers, there has been a lack of detailed research in the area. This study sought to investigate the economic impacts of converting agricultural land to forestry in Ireland, both from farmer and societal perspectives.

## 2. Questions addressed by the project:

Although previous research has been conducted on the economics of forestry in Ireland, a question still existed as to which farmers would benefit from planting land and by how much. This is of particular importance to advisors who must describe the implications of planting. In addition, although forests are well recognised as being providers of non-market benefits there has been limited research into valuing such benefits in Ireland. Thus the project sought to answer:

- Why do farmers plant or not plant forests?
- What are the financial implications of planting?
- How should we measure this?
- What type of farmers plant and who would benefit most?
- What are the broader implications of planting for farmers and the state?
- What are the physical and policy factors driving afforestation?
- How do we value the non-market benefits of forests?

## 3. The experimental studies:

National Farm Survey data were employed to analyse farmer characteristics that influence planting and a supplementary survey was conducted to investigate farmers' plans to plant and the barriers to planting.

The FIVE was developed by building on a simple Visual Basic for Applications in MS Excel. Timber predictions are based on UK Forestry Commission yield models (Edwards and Christie, 1981) and a range of timber pricing options are available.

A regional survey of farmers was conducted that sought to examine farmers views on planting forestry in more detail. The survey included farmers with and without forests.

A national household survey of public attitudes towards the non-market benefit of forests was conducted which included a representative sample of the general population.

Existing spatial data were combined to generate a panel dataset of afforestation at the Electoral Division (ED) level. These data were analysed using spatial econometric techniques.



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Forest recreation travel cost data were collected in face-to-face interviews in Renville forest park in Co. Galway and a range of analysis techniques were employed to identify the consumer surplus of a recreational trip.

## 4. Main results:

Forestry is recognised as a land-use that can deliver many of the goals of sustainable rural development by diversifying farm outputs and the local economy. Accounting for the opportunity cost of land conversion from a range of agricultural enterprises (spring barley, winter wheat, lowland sheep and store to finish beef) the net present value (NPV) of Sitka spruce, ash or mixed plantations were found to be positive in all situations except where ash replaces winter wheat or lowland sheep. From a financial perspective, the greatest gains can be made by replacing a store to finish beef enterprise with Sitka spruce, which results in an NPV of €6,156.

General farmer motivation can affect the probability of a farmer planting or not. Farmers who possess a strong productivist farming motivation were found to be less likely to establish forests. Of the main reasons given by farmers for not planting, the most common response was “need my land for agriculture”. Concern was also expressed about the permanent nature of forestry and the potential to lower the value of land. Farmers involved in livestock production and those with a lower stocking rate were found to be more likely to have land in forestry. In addition, this research would suggest that the presence of children and perhaps successors on a farm influenced the probability of planting. The number of farmers with plans to plant forestry are generally low (3% in 2006 and 3.5% in 2008).

Forests also provide important non-market benefits, including enhancing carbon sequestration and recreation and the public identify forests as an important part of the landscape. Being closer to forests, having children and having a third level education were found to increase the likelihood of visiting forests. This study identifies the consumer surplus of a recreation trip to Renville forest park as €1.48, and an estimation of 89,974 visitors per annum.

Soil and other physical land characteristics play an important role in land-use change to forestry. Results from the spatial afforestation model suggest that land-availability will be an important factor in determining whether afforestation targets will be met, particularly if extensive farming enterprises become more profitable or environmental restrictions are increased.

## 5. Opportunity/Benefit:

The FIVE is the most useful forest valuation tool available for Irish conditions making it of interest to any individual or institution interested in forest investment. The results of the financial study offer greater confidence to land-owners and both Teagasc and private sector advisers that forestry is a competitive land-use. This study highlights the type of farmer likely to benefit financially form converting some land to forestry as well as assessing the characteristics of farmers most likely to plant. In addition, the results of this study highlight the non-market benefits of forests in Ireland.

## 6. Dissemination:

Dissemination took the form of a number of conference presentations and publications in peer-reviewed journals and the popular press. In addition, a forest economics workshop was organised in 2008, which included the project participants, researchers and policy-makers. The FIVE is used by forestry advisers in financial clinics to assess the financial returns from different planting and thinning scenarios for prospective and existing farm forest owners.

### Conference Presentations:

Breen, J. and Ryan, M. (2008). ‘Situation and Outlook for Forestry 2008/09’. Presented at the annual Teagasc Situation and Outlook in Agriculture Conference in Tullamore, December 9, 2008.

Breen, J., Ryan, M., Donnellan, T. and Hanrahan, K. (2009). ‘Measuring the Impact of Policy on Farm Afforestation Rates: An Irish Case Study’ presented at the British Agricultural Economics Society Annual Conference, Dublin, March 31 – April 1, 2009.

Breen, J., Clancy, D., Ryan, M., Wallace, M. (2010). ‘Evaluating the Irish Farm Afforestation Decision: A Discounted Cash Flow Analysis’. Paper presented at the 84th Annual Conference of the Agricultural Economics Society, Edinburgh, Scotland, 29th March - 31st March, 2010.



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Cullinan, J., Hynes, S. and O'Donoghue, C. (2008). 'Using Spatial Microsimulation to Estimate Aggregate Consumer Surplus Values in Travel Cost Modelling'. Presented at the 16th annual meeting of the European Association of Environmental and Natural Resource Economists in Gothenburg, Sweden (June 25th - 28th).

Howley, P., Hynes S., Ryan, M. and Farrelly, N. (2010). 'Afforestation in Ireland: An examination of farm structural factors affecting participation in farm forestry'. Paper presented at Agricultural Economics Society of Ireland.

Ryan, M. (2011) 'Situation and Outlook for Forestry 2010/2011'. Paper presented at the annual Teagasc Situation and Outlook in Agriculture Conference in Portlaoise, Jan 2011.

Upton, V., O' Donoghue, C., Ryan, M. (2012). 'A spatial model of afforestation in Ireland'. Presented at the Agricultural Economics Society of Ireland Annual Conference, 18th October, 2012.

**Main publications:**

Cullinan, J., Hynes, S. and O' Donoghue, C. (2008). 'Estimating Catchment Area Population Indicators for Outdoor Recreation Sites in Ireland'. *Irish Geography* 41 (3): 279 – 294.

Breen, J., Clancy, D., Ryan, M., Wallace, M. (2010). 'Irish land use change and the decision to afforest: an economic analysis'. *Irish Forestry* 67, Nos 1 & 2

Breen, J., Ryan, M., Donnellan, T. and Hanrahan, K. ( 2008). 'Projecting Future Irish Farm Afforestation' 'Figures for Forests' workshop published conference proceedings – Nov. 2008, Freiburg, Germany.

Howley, P., Hynes, S., O' Donoghue, C., Ryan, M. and Farrelly, N. (2012). Farm and farmer characteristics affecting the decision to plant in Ireland. *Irish Forestry* , volume 69, Nos 1&2 : 33-43.

Howley, P., Ryan, M. and O Donoghue, C. (2011) 'Forestry in Ireland: An examination of individuals' attitudes and preferences towards the non-market benefits of forests'. *Irish Geography* 44 (2): 291 – 302.

**Popular publications:**

COFORD Connects 2010: Modelling the economics of forestry in Ireland – the returns to farm forestry.

'Positive findings in Farm Survey'. *Irish Farmers Journal* in February 2009.

'Sharp Rise in Felling Licences Reflects Increased Private Thinnings'. *Irish Timber and Forestry* in March/April 2009.

'Planting trees – good for farmers, good for rural Ireland!' *Irish Timber and Forestry*. No. 4, 2009.

'Demand for forestry planting grants exceeds supply'. *Irish Farmers Journal*, February 10, 2010.

'Dramatic surge in farmer demand for planting'. *Irish Timber and Forestry*. No.1, 2010.

'Outlook for forestry – 2011'. *Irish Farmers Journal*. February, 2011.

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