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### **Explaining the non-economic behaviour of farm foresters: The effect of productivist and lifestyle motivations**

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## **Explaining the non-economic behaviour of farm foresters: The effect of productivist and lifestyle motivations**

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### **Abstract**

Currently rates of planting lag far behind levels that would be expected from a comparison of the returns from farm forestry with competing agricultural alternatives. Previous research has focused on the role of economic factors such as government subsidies, returns from competing agricultural alternatives and structural farm factors in explaining the decision to afforest. By examining the role of farming attitudes and motivations, the aim of this paper is to provide a framework for better understanding farmers' behaviour in relation to the decision to enter into forestry. The results provide rare quantitative evidence that strong lifestyle and productivist motivations significantly affect farmers' behaviour. Environmental values and perceptions regarding the extent to which forestry is seen as a component of a natural landscape were two further factors found to affect the probability of participation. We conclude that the design of policies aimed at encouraging changes in farm activities ought to be guided by a better understanding of the motivations and attitudes of farm operators.

**Keywords:** farm forestry, farming attitudes, farming goals

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## 1. Introduction

Policymakers in many countries have sought, through the introduction of a variety of support packages, to significantly increase the proportion of land in forestry use (Kearney 2001). In the case of Ireland these support packages included the introduction of the Western Package Scheme in 1981, Forest Premium in 1990 and the CAP Afforestation Scheme in 2003 all of which considerably enhanced the financial benefits available to farmers from entering into farm forestry. Despite this, the rate of afforestation is currently significantly behind nationally set targets and uptake rates lag far behind what would be expected from an analysis of economic returns (Behan 2002). Past research has focused on the effect of economic factors such as policy variables, output prices, returns from competing agricultural alternatives and structural farm factors in explaining the decision to afforest. This study seeks to encompass and extend this literature by specifically investigating the role of farming attitudes. We hypothesise in this paper that the attitudes and interests of farmers are likely to vary widely as in contrast to homo-economicus strategies<sup>1</sup>, which assume that farmers behave absolutely rationally and only have profit-maximisation in mind, farmers' decisions are not always aimed at the unique goal of maximising income (Kantelhardt 2006; Key 2005; Key and Roberts 2009).

Specifically this paper derives variables (based on a factor analysis of respondents mean ratings of 14 multiple value items) representing 4 different farming attitudes. The derived attitudinal variables represent firstly the extent to which farmers have attitudes orientated towards profit maximization and secondly the extent to which

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<sup>1</sup> Nyborg (2000) identified 2 types of individuals. In addition to his role as a consumer pursuing his own interests (Homo-economicus), an individual may also regard himself as an ethical observer or citizen, judging matters from society's point of view (Homo Politicus). This suggests that farmers could have different preference functions with respect to what they believe should be produced or grown on their land.

they have a productivist mindset. The derivation of these variables allows us to make a distinction between the goals of profit and output maximisation as with the introduction of a new policy regime which has broken the link between government payments and production, it is now optimal from a financial perspective for many farmers to significantly reduce their levels of activity (O Donoghue and Howley 2012). Despite this policy change many farmers appear, however, unwilling to alter their production behaviour (Gorton et al. 2008). A third attitudinal construct is derived to represent the extent to which farm operators are attracted by the non-pecuniary benefits of farm work as increasingly research has demonstrated that farming may be a vocation that may be valued in itself (Ackerman, et al. 1989; Herrmann and Uttitz 1990; Willock et al. 1999a; 1999b). Finally a variable representing the extent to which farmers are apathetic to environmental issues was derived for examination. These variables are then utilized in a binary logistic model to examine the effect of personal characteristics, farm structural variables, perceptions regarding the appropriate amount of forestry in a natural landscape and finally farming attitudes on farm forestry participation.

## **2. Background**

### *2.1 Factors affecting participation in farm forestry*

Previous research has documented the effect of a diverse range of factors on farm forestry participation. Nagubadi et al. (1996) analysed private forest landowners' participation in forestry assistance programs in Indiana, USA. A probit model was used on data collected from a random sample of 329 Indiana landowners. The analysis revealed that total land owned, commercial reasons for ownership, government sources of information and membership in forestry organizations influenced

landowners' participation in the private forestry programs. Age, fear of loss of property rights and duration since the first wooded tract was acquired also influenced program participation. Landowner participation in private afforestation has also been found to be positively associated with total acres owned, interest in timber production, income, and location of residence on the landowner's woodland (Straka et al. 1984 and Konyar and Osborn 1990). McCarthy et al. (2003) demonstrated how the forestry planting grant, forestry subsidies and the expected forestry market margin were all important factors affecting the decision to plant. Cohen (1983) and Kula and McKillop (1988) found that the returns available in alternative agricultural enterprises are also important explanatory factors.

## *2.2. The role of farming attitudes in explaining behaviour*

Traditional economic theory suggests that individuals make decisions based on the expected change in their level of 'well-being', where the technical term used for well-being or welfare is utility (Edwards-Jones 2006). Given that utility is a difficult concept to measure economists have often made the simplifying assumption that money can act as a substitute for utility. This has led to the situation observed in many agricultural economic models where it is assumed that all farmers are rational profit maximisers or in other words farmers will act in all circumstances to maximise profitability (Edwards-Jones 2006). This approach may not account adequately for the farming behaviour of individuals as it fails to recognise the large and increasing literature which suggests farmers' behaviours result from complex processes influenced by a range of socio-economic and psychological variables (see Willock et al. 1999a; 1999b for a review of this literature). Specifically in relation to explaining farm forestry behaviour, assuming that farmers are rational profit-maximisers does

not accurately predict behaviour as uptake levels have lagged far behind what would be expected from comparing the economic returns from this activity with other more traditional farming enterprises. Farmers farm for reasons other than just maximising profit and a myopic view of the profit maximisation goal as driving farm decisions may misrepresent farmers behaviour (Basarir and Gillespie 2006; Gillespie and Mishra 2011).

It is now widely held that in addition to economic factors, some fundamental aspects of a farmer's psychological make-up may also influence behaviour. In relation to the agricultural sector, the aspect of farmers' psychological make-up which has received most attention to date relates to their attitudes (Edwards-Jones 2006). Attitudes have been defined by Willock et al. (1999a) as 'a positive or negative response towards an attitude object' (where an attitude object may be a person, idea, concept or physical object). Attitudes are formed by what an individual perceives to be true about the attitude-object. Eagly and Chakien (1993) defines an attitude as 'a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour'. In the social sciences the relationships among people's attitudes, goals and behaviours are modelled by the Theory of Reasoned Action (TRA) (Fishbein and Ajzen 1975). This theory argues that behaviour is best predicted by a person's intentions, which are in turn affected by his/her attitudes. This theory has been developed further under the 'Theory of Planned Behaviour' (Ajzen 1991), which suggest that attitudes interact with other aspects of the person to influence behaviour.

In recent times the study of farmer attitudes particularly their role in explaining conservation behaviour has received considerable attention (Kantola et al. 1983;

Lynne and Rola 1988; Carr and Tait 1991; Wilson 1997; Beedell and Rehman 2000; Edwards-Jones 2006; Greiner et al. 2009). Lynne and Rola (1998), for instance, were able to show that both a positive attitude towards the environment and income level were positively related to farm operators' environmental practices. Greiner et al. (2009) determined that strong conservation and lifestyle motivations translated into an intrinsic motivation towards the adoption of conservation practices. Morrison et al. (2011) identified variables relating to human capital (business orientation and information seeking behaviour) and social capital (trust in those delivering programmes and connectedness with other landholders) that had a significant impact on the probability of participation in agri-environmental schemes. In relation to participation in farm forestry, there has been limited attention given to examining the effect of farming attitudes on participation behaviour in empirical models. Those that do exist have generally focused on the effect of attitudes and knowledge towards forestry programmes in explaining participation in farm forestry. Bell et al. (1993), for instance, found that attitudes and knowledge towards Tennessee's Forest Stewardship Program may be more influential in a landowner's decision to participate than monetary incentives. To date, to the best of our knowledge there has not been any studies that have modelled the effect of productivist and lifestyle motivations on farm forestry behaviour.

### **3. Methodology**

The data utilized in this study comes from a nationally representative survey of 799 farmers conducted over 12 weeks between August and October 2011. From a national perspective 11 percent of farmers have land in forestry. In order to facilitate a robust comparison between farmers with and without land in forestry,

approximately one third of the overall survey sample were landowners with forestry. To correct for this oversampling of farm foresters and to allow us to generalise to the entire population we used relevant population weights when conducting the analysis. To ascertain information relating to uptake of farm forestry, farmers were asked to indicate if they had land in forestry use. Given the discrete nature of the dependent variable a binary logistic regression model was specified to examine the effect of specified characteristics on farm forestry participation.

Explanatory variables utilised in the model include variables representing the farm operator's age and education level, probability of having a successor to take over the farm business, stocking rate and the number of farm workers on the farm. A variable representing the proportion of land that is difficult to farm (i.e. land that is wet, has steep slopes or is difficult to access) was entered in the model as previous research suggests that land quality can be a significant determinant of the probability of converting land into forestry. A variable indicating the level of debts associated with the farm business was also included for examination. We hypothesised here that farmers with greater levels of debt would be under relatively greater financial pressure to obtain income from other sources and also more likely to be persuaded by the economic benefits associated with participation in farm forestry. Respondents in the survey were asked to indicate to what extent they feel that forestry is a component of a natural Irish landscape and this variable was also included in the logistic regression model.

Finally four variables representing different farming attitudes were included in the analysis. These variables were designed to capture farmers level of agreement with 1,



profit related objectives, 2, productivist goals, 3, lifestyle or social motivations associated with farm work and finally 4, attitudes towards environmental issues. Farmers' attitudes towards these objectives were captured by including a number of attitudinal statements in the survey questionnaire. Survey respondents were asked to indicate how much they agreed or disagreed with each statement on a scale from 1 to 10 with 1 being completely disagree and 10 being completely agree. A description of the attitudinal statements included in the questionnaire is given below:

*Profit orientation:* Statements included here were designed to capture attitudes in relation to financial success and making the farming enterprise a successful business. Farmers scoring highly on this variable would typically have a strong level of agreement with statements such as: “The main goal from farming should be to maximize profits” and “It is important to visit other farms to look at their methods”.

*Productivist:* Statements included here were designed to capture attitudes in relation to the importance of using all farm land for maximizing production. Farmers scoring highly here would typically have a strong level of agreement with statements such as “It is a waste leaving farm land idle and not using it to produce agricultural goods” and “More of our land should be use for producing food”.

*Lifestyle:* These statements were designed to capture perceptions relating to the benefits of farm work relative to non farm work. Individuals scoring highly on this domain would express agreement with statements such as “I enjoy farming much more than other potential sources of employment” and “Farming is a more rewarding job in terms of quality of life, independence, lifestyle than it is in terms of money”.

*Environmental apathy*: Farmers scoring highly on this domain would be relatively indifferent to environmental issues. Statements included here were: “I find it hard to get too concerned about environmental issues” and “I believe society places too much emphasis on environmental issues”.

It was hypothesised that the variables productivist, lifestyle and environmental apathy would be negatively related to farm forestry participation for different reasons. First respondents with a relatively strong productivist mindset would have more of what can be termed a traditionalist value orientation and feel that land resources should be used for more conventional agricultural activities. Individuals who are more likely to enjoy farm work and the farming lifestyle relative to other endeavours may be less likely to consider forestry as they would lose the lifestyle or non-economic benefits associated with farm work. Finally previous research has established that environmental values are good predictors of participation in agri-environmental schemes (Greiner et al. 2009). As such it was thought useful to explore if environmental values (in this instance indifference to environmental issues) can also be useful in explaining farm forestry participation. It was unclear as to whether the variable ‘profit orientation’ would have a statistically significant effect and if so in what direction. On the one hand, the economic benefits of farm forestry would be attractive to individuals who are strongly motivated by profit related objectives. On the other hand, it would be expected that individuals with a strong business orientation would be running a more profitable farm business and so would have less need to consider alternative farm production strategies. Table 1 provides more detail in relation to the variables utilized in the binary logistic regression model of farm forestry participation.

*Insert table 1 here*

A factor analysis was employed on the various statements designed to capture farming attitudes. Factor analysis is predominantly concerned with data reduction and is performed by examining the pattern of correlations (or covariances) among a number of variables and transforming a set of correlated variables to a smaller number of uncorrelated variables. If some of the original variables are highly correlated, they are effectively ‘saying the same thing’ and factor analysis identifies a small number of common factors that account for most of the variation in ratings (Kline and Wichelns 1998). Factor loading coefficients were used to compute standardized factor scores for survey respondents with each having a mean of zero and a standard deviation of one. Each of the respondents factor scores are relative to the sample mean, which corrects for any potential bias accruing from respondents giving positive responses “yea-saying” (Blamey et al. 1999)<sup>2</sup>. The factor scores have the added advantage that they can be used in regression analysis in place of the original attitudinal statements, with the knowledge that the meaningful variation in the original data has not been lost but that the derived variables are uncorrelated thus preventing any potential multicollinearity problems.

Before presenting the results of the model developed to examine participation in farm forestry, we present, following Hynes and Garvey (2009), a simple theoretical framework to explain farmer decisions based on a choice between planting forestry and the statuesque of non-participation in farm forestry. This choice will be determined by his or her utility associated with each option. The satisfaction or utility derived from planting forestry can be expressed as:

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<sup>2</sup> We do not go into the technical aspects of conducting a factor analysis here but the interested reader is advised to see Reymont and Joreskog, (1993) for an in-depth analysis of the use of this methodology

$$U_{FORESTRY}(P + N, \bar{E}; Z; A) \quad (1)$$

while the utility from not planting can be given by:

$$U_S(N, 0; Z, A) \quad (2)$$

where  $P$  is the farm forestry grant,  $N$  is family farm income,  $Z$  is a vector of farm and farmer characteristics that affect utility,  $A$  is the productionist, environmental and lifestyle attitudes of the farm operator (as captured by the factor loading variables) and  $\bar{E}$  is the additional effort that is necessary on the part of the farmer to plant and maintain land in forestry use. A decision function can then be given as:

$$Y^* = U_S(N, 0; Z) - U_{FORESTRY}(P + N, \bar{E}; Z) \quad (3)$$

Although the value of  $Y^*$  is not observed, a discrete participation indicator is observed, given by  $Y = 1$  if  $Y^* > 0$  and 0 otherwise, where 1 represents participation in farm forestry activity and 0 indicates non-planting. The decision function that the farmer evaluates when contemplating participation in farm forestry can be rewritten as:

$$Y^* = U_S(N, 0; Z) - U_{FORESTRY}(P + N, \bar{E}; Z) = \mathbf{X}\beta + \varepsilon \quad (4)$$

where  $\mathbf{X}$  is a vector containing proxy variables for  $P$ ,  $N$ ,  $\bar{E}$ ,  $A$  and  $Z$ ;  $\beta$  is a parameter vector, and  $\varepsilon$  is an error term. This function can then be estimated employing maximum likelihood estimation procedures and using the standard discrete choice logit model.

#### 4. Results

The full list of attitudinal statements and associated overall mean scores are presented in table 2. As expected the factor analysis resulted in four factors with an eigenvalue  $> 1$ , together explaining 59 percent of the variance<sup>3</sup>. The factor analysis facilitated identification of underlying relationships among the multiple value items and also provided a statistical test of the validity of the classification of our constructs. The statements relating to business orientated objectives loaded highly on the first factor and as such were labelled 'profit orientation'. The statements related to goals concerned with maximising the use of land resources for traditional types of agricultural activity loaded highly on the second factor and as such this factor was termed 'productivist'. The statements related to the non-economic benefits of farm work and environmental apathy loaded highly on the third and fourth factors respectively and were therefore termed 'lifestyle' and 'environmental apathy'. These individual factor variables were then utilised in a binary logit model to examine if they could help explain farm forestry participation behaviour.

The results from the binary logit model designed to examine factors affecting farm forestry behaviour are presented in table 3. Unlike linear regression models the regression coefficients stemming from the logistic model which is based on maximum likelihood estimation procedures are difficult to interpret. To facilitate the interpretation of the relevant size and magnitude of the effect of the explanatory variables on the probability of having land in forestry use, table 3 also presents the

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<sup>3</sup> An eigenvalue greater than 1 indicates that the variance of each of the factors extracted is at least equal to the variance attributable to one of the variables used in the analysis

odds ratios<sup>4</sup> for the coefficients of the independent variables. The odds ratios for the coefficients of the independent variables allows us to see the likelihood that this variable category is associated with having land in forestry. The column headed *Odds StdX* presents the odds ratios for a standard deviation change in the independent variable which is particularly useful for evaluating the relative impact of variables that are not discrete and on different scales.

In terms of the influence of the explanatory variables on the decision to participate in farm forestry, it was found that of the personal characteristics, age was positively associated with farm-forestry participation. In a cross sectional model such as this, it is difficult to determine if age does indeed significantly influence the probability of participation in farm forestry or is simply capturing the fact that as the decision to afforest in Ireland is a permanent one it would be expected that farmers with land in forestry would have an older age distribution<sup>5</sup>. To determine if age is not just positively associated with participation but actually has a causal impact then it would be necessary to utilise a panel dataset to examine the factors that effect the initial entry decision. Education did not have a statistically significant impact on farm forestry participation. It could be hypothesised that principal farm operators who are most likely to have a successor to take over the farm would be less likely to have land in forestry use as they may wish to keep their land use options open for their successor. While of the expected sign the variable representing the probability of a farm successor was not found to be statistically significant (albeit bordering statistical significance at the 10 percent level).

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<sup>4</sup> see Long and Freese 2006 for a more detailed discussion surrounding the derivation and application of odds ratios

<sup>5</sup> A land use change from agriculture to forestry in Ireland is a permanent decision due to the legal requirement under the 1946 Forestry Act to replant after clearfell

A one standard deviation increase in the number of farm workers on the farm which was approximately equal to 1 (0.98) decreased the probability of having land in forestry by a factor of 0.70. Similarly a one standard deviation increase in the stocking rate which corresponds to an increase of 23 farm animals decreased the probability of having land in forestry by a factor of 0.57. Land quality was also negatively associated with farm forestry participation as a one standard deviation increase in the amount of land that is difficult to farm increases the odds of farm forestry participation by a factor of 2.3. Farmers who reported that their farm business is either lightly or heavily in debt were found to be 1.5 times more likely to have converted land to forestry than farms with no reported business debts. Farmers who report that their idea of a natural Irish landscape is one without any forestry were 0.07 times more likely to have land in forestry use. Put another way, farmers who feel that a natural Irish landscape is one that is either partially or substantially forested were 14.2 (1/0.07) times more likely to have land converted to forestry than farmers who feel a natural Irish landscape is one without any forestry.

The variables representing productivist and lifestyle motivations as well as the variable capturing the extent of indifference on the part of farmers towards environmental issues, were also statistically significant determinants of farm forestry behaviour. More specifically, farmers with relatively higher scores on each of these derived factor variables were less likely to have land in forestry use. For a one standard deviation increase in the factor scores for productivist, lifestyle and environmental apathy the odds of having land in forestry decrease by a factor of 0.83, 0.82 and 0.83 respectively. A further illustration of the effect of these variables can be obtained by comparing the predicted probability of having land in forestry for the

farmer with the highest and lowest scores on these attitudinal constructs holding all other variables at their means. The farmer with the highest factor score for the variable productivist had a mean predicted probability of .057 of having land in forestry; i.e. we would expect 5.7 percent of individuals with these characteristics to be involved with forestry. The farmer with the lowest factor score had a mean predicted probability of 0.16. In relation to the variable 'lifestyle' the individual with the highest and lowest factor scores had mean predicted probabilities of 0.05 and 0.20 respectively and finally for the variable environmental apathy the mean predicted probabilities were 0.06 and 0.13 respectively. The factor variable representing farmers' attitudes towards profit related objectives was not found to have a statistically significant effect on farm forestry participation.

## **5. Discussion**

The results from table 3 would suggest that there are a variety of factors that influence farmers' behaviour in relation to farm forestry participation. Farmers with higher stocking rates and farms with relatively poorer land quality are less likely to consider converting land to forestry. This is supportive of previous research which found that farmers in relatively more intensive farm systems and with better land simply feel that their land is too good for forestry (Ni Dhubhain and Gardiner 1994; O Leary et al. 2000). In addition, the economic returns from farms with relatively higher stocking rates and more generally from farms with better land quality would be expected to be higher, and as such the forest premiums available would be relatively less attractive for these farmers. The finding that farms with greater levels of farm business debts are more likely to have land in forestry use could be explained by the fact that these farms face tighter budget constraints and as such may be more enticed by the long-term



consistency of the economic returns, through the forestry schemes, associated with participation in farm forestry. Despite a strong heritage in relation to forestry, in that for many thousands of years Ireland was a naturally wooded country, 11 percent of farmers reported that that they felt their idea of a natural Irish landscape is one which has no forests at all. This group of farmers were in turn much less likely to have land in forestry use.

Previous research suggests that while agricultural policy has undergone a radical shift from one that centred on coupled towards decoupled payments, whereby save for some cross-compliance obligations agricultural activity is not necessary to receive support, there is little evidence that farmers' attitudes have also adjusted. Gorton et al. (2008), for instance, examined farmers' attitudes towards agricultural production and policy support in the context of the 2003 CAP reform among five Member States in the EU. The study highlighted how farmers still overwhelmingly retain a productivist mindset and expressed preferences for the full utilization of agricultural land for agricultural production and wished to concentrate on farming. Similarly, Lobley and Butler (2010) notes that while the 2003 CAP reform agreement may have radically altered the policy environment within which farmers operate there is little evidence that farmers are reacting in an equally radical manner. The results presented here would support previous work suggesting that farmers still maintain a productivist mindset as the two most highly rated goals reported by farmers were not profit or business related objectives but were "It is important not to leave farm land idle" and "It is a waste leaving farm land idle and not using it to produce agricultural goods". The results presented in this paper would also suggest that these productivist

orientated attitudes act as an important disincentive to farmers in taking up farm forestry.

As evident by the high means scores on each of the relevant attitudinal statements (see table 2), farm operators, for the most part, feel that there are extra non-pecuniary benefits associated with farm work. This perception, in turn, was also shown to act as a strong disincentive for farmers in terms of participating in farm forestry. It could be suggested that farmers, to a large extent at least, are perhaps not just driven by financial goals but are also influenced by goals in relation to the satisfaction associated with farm work. Farmers may fear a possible diminution in the lifestyle and social benefits associated with traditional farm work if they convert land into forestry use. Finally, the role of environmental values in explaining environmental related practices of farmers has received considerable attention (Lynne and Rola 1988; Beedell and Rehman 2000; Greiner et al. 2009). In particular, previous research has found that positive environmental attitudes increase the probability of participation in various agri-environmental schemes. This analysis also suggests that the reverse is true, in that individuals who can be described as relatively apathetic to environmental issues were less likely to participate in farm forestry.

## **6. Conclusion**

Previous research has highlighted a wide array of factors that affect rates of private afforestation (see Beach et al. 2005 for a review). These include market drivers such as output prices and returns to alternative farm activities, policy variables such as changes in the levels of grants and/or premiums and plot/resource conditions such as soil quality and plot size. This study aimed to provide a deeper understanding as to

the effect of not only characteristics of the farm but also the role of psychological factors on farm forestry participation. In keeping with previous research, relatively more intensive and hence profitable farm types were less likely to have planted land. Farm businesses in debt were more likely to have land in forestry use. The regular guaranteed income provided by forestry in terms of annual payments may be relatively more attractive to this cohort of farmers.

In addition this study identified a number of factors that do not necessarily affect the costs and/or benefits of farm forestry but do nonetheless significantly affect behaviour. One such variable was perceptions regarding the extent to which forestry is seen as a component of a natural Irish landscape which was positively associated with farm forestry participation. Personal goals were also found to be a significant driver for land use decisions. As in other enterprises, objectives relating to maximising profits are likely to be important to farmers. That said, the research presented here provides rare empirical support for the hypothesis that the adoption of farm forestry is strongly affected by factors other than the financial benefits obtained. More specifically, farmers had strong production orientated motivations and also generally perceived there to be a variety of non-pecuniary benefits associated with farm relative to non farm work. These attitudes in turn served to discourage farmers from converting land into forestry. In addition, environmental values were also found to be a significant determinant of land use decisions with farmers who are relatively indifferent to environmental issues found to have a much lower probability of converting land to forestry.

To sum up, the analysis presented in this paper would suggest that in addition to economic factors, overall values and attitudes of the farmer are likely to be important determinants of farm behaviour. This analysis represents the first attempt to model the effect of productivist motivations as well as perceptions regarding the non-economic benefits associated with farm work on farm forestry participation behaviour. Outside of explaining farm-forestry participation, farming attitudes and motivations may have an important impact on farmers' behaviour in relation to a variety of farm activities. There is perhaps a need therefore for a greater integration of both farming attitudes and financial factors in economic models concerned with understanding and predicting farmers' actions. To date, the emphasis has been on the use of monetary incentives to change the activity levels of farmers. From a policy perspective, this research suggests that the design of policies aimed at encouraging greater adoption rates in relation to farm forestry, ought to be guided by a better understanding of the motivations and attitudes of farmers so as to be able to tailor incentives for maximum effectiveness. A useful avenue for future research therefore would be to examine policy alternatives that create the correct incentives that would encourage farmers of differing motivational profiles to participate in farm forestry.

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## List of tables

*Table 1: Data for forestry participation model*

Variable	Description	Mean	Min	Max
Age	1= under 15, 2= 15-19, 3 = 20-24, 4 = 25-29, 5 = 30-34, 6 = 35-39, 7 = 40-43, 8 = 45-49, 9 = 50-55, 10 = 55-59, 11 = 60-64, 12 = 65-69, 13 = 70-74, 14 = over 75	9.53	2	14
Education	1 = completed secondary and/or third level education, 0 otherwise	.443	1	0
Successor	1 = Definitely do not have a successor, 2 = unlikely, 3 = Not sure, 4 = likely, 5 = very likely, 6 = definitely	4.12	1	6
Farm workers	Number of individuals reported by principal farm operator as working on the farm	1.48	0	12
Land quality	Amount of land that is difficult to farm (i.e. wet, steep slopes, difficult access): 1 = < 10 ha, 2 = 10-25 ha, 3 = 20-50 ha, 4 = 50-75 ha, 5 = 75-100, 6 = 100 plus ha	1.83	1	7
Stocking rate	No of livestock (cattle or sheep)/Farm size	19.9	0	300
Debt	1 = report that the farm business is either lightly or heavily in debt, 0 no farm business debts	.47	0	1
Forest natural	1 = report that a natural Irish landscape is one without any forests, 0 = a natural Irish landscape is partially or substantially forested	.11	0	1
Productivisit	Factor variable measuring the degree to which principal farm operators feel that the full utilisation of land for maximising output is important	0	-3.46	2.58
Profit orientation	Factor variable measuring the degree to which principal farm operators feel profit orientated objectives and activities are important		-4.76	2.0
Lifestyle	Factor variable measuring the degree to which principal farm operators feel there are extra non-monetary benefits associated with farm relative to farm work	0	-4.5	2.65
Environmental apathy	Factor variable capturing the extent to which farmers are indifferent to environmental issues	0	-2.4	2.45

Table 2: Factor loadings – farming attitudes (values > .5 are highlighted in bold)

	<i>Profit orientation</i>		<i>Environmental apathy</i>		Mean scores
	<i>Productivist</i>	<i>Lifestyle</i>			
To be successful in farming it is important for me to adopt and uptake new technologies	<b>0.722</b>	-0.008	0.063	0.044	7.41
It is important to visit other farms to look at their methods	<b>0.718</b>	0.084	0.128	-0.161	7.91
It is important to have the best livestock/crops/pastures	<b>0.518</b>	0.467	0.164	-0.08	8.53
The main goal from farming should be to maximise profits	<b>0.589</b>	0.251	0.092	0.118	7.73
It is important not to be afraid of adopting new farming practices	<b>0.651</b>	0.324	0.009	-0.189	8.38
Farm production is the thing to take most pride in	0.466	<b>0.503</b>	0.246	-0.024	8.3
It is important not to leave farm land idle	0.28	<b>0.766</b>	0.088	0.017	8.85
More of our land should be used for producing food	0.046	<b>0.72</b>	-0.045	0.186	7.82
It is a waste leaving farm land idle and not using it to produce agricultural goods	0.097	<b>0.657</b>	0.372	-0.034	8.58
Farming is a more rewarding job in terms of quality of life, independence, lifestyle than it is in terms of money	0.04	0.207	<b>0.838</b>	-0.081	8.34
I enjoy farming much more than I would other potential sources of employment	0.128	0.186	<b>0.803</b>	0.02	8.28
I could make more money in other employment but I would miss farming too much to give it up	0.387	-0.219	<b>0.515</b>	0.227	6.78
I believe society places too much emphasis on environmental issues	-0.014	0.082	-0.037	<b>0.843</b>	5.72
I find it hard to get too concerned about environmental issues	-0.085	0.039	0.055	<b>0.815</b>	5.34
<i>Initial eigen values</i>	4.3	1.6	1.3	1.2	

Table 3: Factors affecting farm forestry participation

	Robust Std.			Odds Ratio	Odds StdX	SDofX
	Coefficient	Err.	P>z			
Age***	0.10	0.05	0.03	1.11	1.31	2.62
Education	0.00	0.23	0.99	1.00	1.00	0.50
Successor	-0.11	0.07	0.11	0.90	0.85	1.51
Farm workers*	-0.35	0.14	0.01	0.70	0.71	0.98
Land quality***	0.84	0.10	0.00	2.32	2.11	0.89
Stocking rate***	-0.02	0.01	0.00	0.98	0.58	23.18
Debt*	0.41	0.22	0.07	1.51	1.23	0.50
Forest natural***	-2.63	0.72	0.00	0.07	0.42	0.33
Productivist**	-0.19	0.10	0.05	0.83	0.83	0.96
Lifestyle *	-0.21	0.11	0.05	0.81	0.82	0.95
Apathy*	-0.19	0.11	0.08	0.83	0.83	0.97
Profit orientation	-0.08	0.11	0.43	0.92	0.92	0.95

Odds StdX is the odds ratios for a standard deviation change in the independent variable. SDofX is the standard deviation of the explanatory variables

\*\*\*indicates statistically significant at 1 percent level, \*\* indicates statistically significant at 5 percent level, \* statistically significant at 10 percent level.