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Factors affecting the level of farm indebtedness: the role of farming attitudes.

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Peter Howley * and Emma Dillon

Abstract

Using a nationally representative survey of farm operators in Ireland, this paper aims to provide a framework for better understanding the characteristics that influence the degree of indebtedness on farm businesses.

This paper derives explanatory variables (based on a factor analysis of respondents mean ratings of 13 multiple value items) representing 3 different farming attitudes. An ordered logit model is then formulated to examine the effect of farming attitudes as well as personal characteristics and farm structural variables on the degree of indebtedness.

Personal characteristics of the farmer such as age and education as well as farm structural variables such as farm size and farm system were all found to have a statistically significant impact. The presence of decoupled farm payments was also found to affect the degree of indebtedness. The study identified two distinct farming attitudes which were found to have important but opposite effects. These were attitudes strongly orientated to business related objectives which was positively associated with having farming debts and secondly positive attitudes relating to the benefits of farm relative to non-farm work which was negatively associated with the degree of indebtedness.

Past research has focused on the effect of socio-demographic characteristics and farm structural variables in examining differences in farm indebtedness. This study extends this literature by specifically examining the role of farming attitudes. Obtaining a deeper understanding of the factors that affect the level of farming debt will be important as the degree of indebtedness has been found to affect farmers' management decisions. Furthermore, outside of explaining farm credit use, farming attitudes and motivations may have an important impact on farmers' behaviour in relation to a variety of farm activities.

Keywords: farm indebtedness, farming attitudes, Ireland

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1. Introduction

Between 1995 and 2008 the Irish economy experienced profound economic change as Irish Gross Domestic Product (GDP) grew from €51.9 billion to €181.8 billion. Initially this strong economic growth was a result of an exceptional flow of foreign direct investment particularly from the US brought about at least in part by policies such as low corporation taxes and increased rate of investment in second and third-level education (Honohan and Walsh 2002; Whelan, 2011). The new technology and skills that this inflow brought made a significant contribution to our national productivity. A second factor which played an important role during this time was a dramatic increase in the number of people at work. This was a result of young workers emerging from the educational system and increased female labour force participation. While at the start of the 1990s Ireland had living standards that were far below that in other European countries, by 2001 Ireland had caught up and even surpassed many other EU economies.

By the start of the new Millennium there was every reason to expect that this period of economic growth commonly referred to as the “Celtic tiger” had run its course as the unemployment rate was extremely low by international standards, GDP per capita had caught up with the EU average and the employment to population ratio was only just below the levels recorded in the US and UK (Whelan, 2011). Ireland, however, witnessed an extraordinary housing boom from 2000 to 2008 which continued to fuel economic growth. The total stock of dwellings gradually increased from 1.2 to 1.4 million between 1991 and 2000 but increased to 1.9 million by 2008 and by 2007 construction accounted for 13 percent of all employment. Against the backdrop of this strong economic growth, farmers found it relatively easy to secure employment off the farm, most commonly in the construction sector (O’Brien, et. al., 2007). According to the Irish National Farm

Survey, the number of farm households where the spouse and/or operator was employed off-farm increased from 37 per cent in 1995 to 58 percent in 2007 (O'Brien, et. al., 2007). As a result of the take up of off-farm employment by both principal farm operators and their spouses, many farming households witnessed a substantial increase in real income over this period although income from the farm declined by almost 17 percent in real terms. Coupled with low interest rates, rising real incomes led to many farming households making significant investments in their farming business as net new investment¹ increased by almost 30 percent between 1995 and 2005 (Connolly et al. 2006).

Eventually the housing market in early 2008 came to what Brian Lenihan, the incoming Minister for Finance, referred to in June 2008 as “a shuddering halt”. The governments’ tax base collapsed as it was largely reliant on housing related tax revenues such as stamp duty, capital gains tax and VAT. The rate of unemployment increased from around 5 percent in early 2008 to just over 14 percent 3 years later. In line with these changes in the wider macroeconomy the number of households where the farmer and/or the spouse has an off-farm income declined in 2010 for the third consecutive year, to 49% (down 4% from the previous year) (Hennessy, et. al., 2011). Furthermore, average net new investment per farm was €1,502 in 2009, a 90% decline on 2008 (€15,506). This followed an increase of 66% between 2006 and 2007 and an increase of 56% between 2007 and 2008. The decline in off-farm employment opportunities and rising real interest rates now mean that levels of debt have become unsustainable among many agricultural households.

¹ Net new investment is defined as all capital expenditure during the year, less sales of capital and grants received. It does not include land purchase.

The aim of this paper is to provide a framework for better understanding decisions in relation to the accumulation of debt by farm businesses. Past research has focused on the effect of socio-demographic characteristics of the farmer, farm structural variables and the availability of loans from lenders in examining differences in the level of debt among farming households. This study seeks to encompass and extend this literature by specifically examining the role of farming attitudes in explaining the accumulation of debt. Farmers will accrue debt if they expect that this will help them achieve their goals. We hypothesise in this paper that these goals will include maintaining the lifestyle and social benefits associated with farm work as well as business related objectives. Obtaining a deeper understanding of the factors that affect the level of farming debt will be important as the degree of indebtedness has been found to affect farmers' management decisions (Phimister, 1995; Gloy et al., 2002; Mishra et al., 2004). In addition, a more complete understanding of farm indebtedness will help inform future policy in the context of a changing agricultural landscape and further reform of the Common Agricultural Policy.

2. Background

Previous research has documented the effect of both characteristics of the farmer and farm structural variables on the level of debt among farming households. In a study of farming households in the US, Katchova et al. (2005) found gross farm income, risk management strategies, and operators age and risk aversion had significant influences on the probability of levels of debt by rural residence, intermediate and commercial farms. Harris et al. (2009) found that factors such as age of the farm operator and risk aversion play significant roles in explaining patterns of debt among farm businesses. Further research has studied the supply of agricultural credit by lenders. For example, Zhao et al.

(2008) investigated the effect of signalling on farm capital structure, finding that signalling affects agricultural credit relationships through past measures of past cash flow and profitability. Turvey and Weersink (1997) examined lender-borrower relationships and found that loan demand is partly determined by lenders willingness to provide debt. Transaction costs and asymmetric information problems have also been found to significantly affect the supply of credit to farms (Benjamin and Phimister, 1997; Bierlen et al., 1998; Barry et al., 2000).

None of these studies have examined the role of underlying farming attitudes on credit use. Therefore, the hypothesis explored in this study is that in addition to differences in personal characteristics and farm structural variables, differences in attitudes of the farmer will also partly explain levels of farming debts. 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 recent times the study of farmer attitudes particularly the role of positive attitudes towards environmental issues 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).

As in other businesses, farmers are likely to be interested in making profits. That said, the goals and interests of farmers are likely to vary widely as in contrast to homo-economicus’ strategies 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 and Roberts, 2009). 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). This means that for some farmers, goals such as maintaining the farming lifestyle may be as important or even more important than goals such as output or profit maximisation. This perhaps explains the common observed phenomenon of many farm enterprises using decoupled payments to subsidise what would otherwise be unprofitable farm production in order to maintain a farming lifestyle (El-Osta et al. 2004; Colman and Harvey, 2003; Breen et al., 2005; Howley et al., 2011).

Within this context, the aim of this paper is to examine the effect of attitudes towards goals related to both profit and output maximisation with that of wider lifestyle benefits from farming on levels of credit use. A distinction is made between the goals of profit and output maximisation as with the introduction of a new policy regime breaking the link between government payments and production, it is now optimal from a financial perspective for many farmers to significantly reduce their levels of production (O'Donoghue and Howley, 2012). Despite this policy change many farm operators appear unwilling to change their behaviour (Gorton et al., 2008). Therefore we derive separate latent constructs representing farmers' attitudes towards profit and output related goals as well as farmers perceptions regarding what we define as non-economic benefits associated with farm work. These constructs are then utilised in an ordered logit model to examine their influence on the levels of farm business debt.

3. Methods

The data utilised in this study comes from a nationally representative survey of 607 farmers conducted over 12 weeks between August and October 2011. A quota controlled sampling procedure was followed to ensure that the survey was nationally representative for the population aged 15 years and above. Quota sampling sets demographic quotas on the sample based on known population distribution figures. The quotas used here were based on known population distribution figures in relation to specific farm types taken from the Central Statistics Office. Pilot testing of the survey instrument was conducted prior to the main survey. Along with expert judgment, the results from the pilot were used to refine the questions asked in the main survey. To ascertain information relating to the level of debt on farms, respondents were asked to indicate which of the following would best describe the level of debt on their farm business; none at all, lightly in debt or finally, heavily in debt. Just over 52 percent of respondents reported that they had no debt associated with their farm business, 32 percent reported that they were lightly in debt, with just under 10 percent stating that their farm business was heavily in debt.

Given the structure of the dependent variable, an ordered logit model was formulated to explore the role of specified characteristics on the probability of having farming debts as this estimates both the effects of the independent variables (through the systematic component) and the thresholds of the dependent variable (through the stochastic component) at the same time (see Greene, 1997; Long, 1997 for a more detailed description of this type of estimation). Explanatory variables utilised in the model include variables representing the farm operator's age, education level, presence/absence of a successor to take over the farm business as well as farm structural variables such as farm size and farm system. These variables were selected for examination based on a

priori expectations as to what factors will affect the level of farm business debts. A variable representing the amount of decoupled payments received by the farm household was also included for examination as previous research has pointed to the fact that decoupled payments may increase on-farm investments by reducing risk aversion and may also increase the probability of receiving loans from lenders (Bhaskar and Bergin, 2009).

Finally three variables representing different farming attitudes were included in the analysis. These attitudes were related to profit orientated objectives, productivist motivations and lastly, perceptions regarding the non-economic benefits of farm relative to non-farm work. 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 multiple value items 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 'profit orientation' 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 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 and lifestyle than it is in terms of money”. Table 1 provides more detail in relation to the variables utilised in the ordered logit model.

Insert table 1 here

A factor analysis was employed on the various attitudinal statements which facilitated the identification of underlying relationships among the multiple value items and provided a statistical test of the validity of the classification of our constructs. Factor analysis is predominantly concerned with data reduction and is performed by examining the pattern of correlations (or covariances) among independent variables and reveals simple underlying structures among these variables using analytical solutions from linear algebra. 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 standardised 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). 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. The factor scores resulting from the analysis of the attitudinal statements measure the degree to which individuals’ attitudes towards profit orientated objectives, output maximisation goals and finally perceptions regarding the non-monetary benefits associated with farm work deviate either positively or negatively from the sample mean score for each factor. The individual factors scores were used as explanatory variables to examine their impact on the probability of farm businesses being in debt.

4. Results and interpretation

The results from the factor analysis of the multiple value items designed to capture farming attitudes along with their overall mean scores are presented in table 2. As expected the first factor had high factor loadings for the statements related to business orientated objectives and consequently this factor was labelled as ‘profit orientation’. The second factor had high factor loadings on the attitudinal statements designed to capture attitudes towards goals related to maximising output and the full utilisation of land resources and therefore this factor was labelled as ‘output maximisation’. Finally the statements designed to capture the extent to which farmers perceive there to be a number of non-economic benefits associated with farm as opposed to non farm work all had high factor loadings on one specific factor and therefore this factor was classified as ‘lifestyle’. All the attitudinal statements had high factor loadings on one specific factor with the exception of “Farm production is the thing to take most pride in” which loaded highly on

“profit orientation” and “productivist”. This was left in the analysis and held as representing both factors as it logically fits each.

Insert table 2 here

The results from the ordered logit model designed to examine factors affecting the level of debt on farms are presented in table 3. Firstly, in terms of personal characteristics, age and education were both found to have a statistically significant impact on the probability of accumulating farming debts. Structural farm factors were also found to have a statistically significant effect. Farmers with relatively higher levels of decoupled farm payments as well as farmers who planned to increase output in the next 5 years were also more likely to have farming debts. In relation to the attitudinal constructs, both business orientation and lifestyle had statistically significant effects whereas productivist did not have a statistically significant impact.

Insert table 3 here

Unlike linear regression models the regression coefficients stemming from the ordered logit model (which is based on maximum likelihood 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 farming debts, table 3 also presents the odds ratios² for the coefficients of the independent variables. The odds ratios (column headed e^b) for the coefficients of the independent variables allows us to see the likelihood that this variable category is associated with a propensity to have farming

² See Long and Freese 2006 for a more detailed discussion surrounding the derivation and application of odds ratios

debts. The column headed e^{bStdX} 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 relation to age, individuals who are under 45 are 1.83 times more likely to accumulate farming debts than individuals who are over 45. This would be in keeping with the life cycle hypothesis which suggests that farmers pay off their debts as they age (Katchova et al., 2004). A one standard deviation increase in the level of education increases the propensity to acquire debt by a factor of 1.36. Farm operators with a successor were 1.35 times more likely to have farming debts. This variable, however, was not found to be statistically significant. Increasing farm size by one standard deviation increases the probability of acquiring debt by a factor of 1.49. Dairy farmers were 1.76 times more likely to acquire debt than other farm types. The findings in relation to farm size and farm system could perhaps be explained by the greater profitability of dairy farms and/or larger farms relative to other farm types. As such they have greater potential to both service farming debts and also a greater likelihood of being granted loans from lenders.

Farms with decoupled farm payments of €10,000 or more were 2.57 times more likely to accumulate debts than farms with payments of less than €10,000 which is in keeping with previous research (Katchova, 2004). It has been suggested that decoupled payments can increase levels of debt by decreasing risk aversion and also by increasing the probability of being granted loans from lenders (Bhaskar and Beghin, 2009). Farmers who intend to increase their level of production are 1.3 times more likely to have farming debts. This could suggest that credit use is being used to order to increase productivity rather than being used as a cushion to maintain current strategies in the face of decreasing returns.

A one standard deviation increase in the factor variable 'profit orientation' increased the probability of farming debt by a factor of 1.19 and a one standard deviation increase in the factor variable 'lifestyle' decreased the probability of having farm debt by .79. A further illustration of the effect of these variables can be obtained by comparing the predicted probability of being in debt for the individual 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 termed business orientation had a mean predicted probability of .62 of being either lightly or heavily in debt. In other words, we would expect 62 percent of individuals with such characteristics to be in debt. The farmer with the lowest factor score had a mean predicted probability .39. In relation to the variable 'farming value' the individual with the highest and lowest factor scores had mean predicted probabilities of being either lightly or heavily in debt of .40 and .78 respectively. Therefore, we can identify two distinct classes of farmers each of which will have very different probabilities of having farm related debts. It could be that more business orientated farmers will seek credit as a means to increase profitability and more generally to improve the farm business. On the other hand, farmers with high scores on the variable 'lifestyle' are perhaps not just driven by financial goals but are also influenced by goals in relation to the satisfaction associated with farming.

Previous research suggests that while agricultural policy has shifted from one focused on maximizing production to more decoupled forms of payment, there is little evidence that farmers' attitudes have also adjusted. Gorton et al. (2008) highlighted how farmers still overwhelmingly retain a productivist mindset and expressed preferences for the full utilisation of 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 alerted 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”. This attitude domain did not, however, have a significant impact in explaining farming debts. Therefore, while farmers are hesitant to reduce output despite the changing policy regime they appear to be reluctant nonetheless to accumulate debt to support this endeavour.

5. Conclusion

This study examined factors affecting the degree of indebtedness on Irish farms. The results of this research should provide a deeper understanding of the role of not just personal characteristics and farm structural variables affecting farm credit use but also the impact of underlying farming motivations. In line with previous research, age was found to be negatively associated with indebtedness which is in keeping with the life-cycle earnings hypothesis which suggests that individuals pay off their debts as they age. Education was found to have a positive effect on the probability of having farm business debts. In relation to characteristics of the farm, farm size and being a dairy farmer were both positively related to levels of debt. This perhaps reflects the greater ability of these farm types to both pay off debt and to obtain loans from lenders. The degree of indebtedness was also positively associated with future planned behaviour with farmers more heavily in debt much more likely to report that they planned to intensify production over the short term. Farmers with relatively higher levels of decoupled payments were

also more likely to have farm business debts. This is in keeping with previous research which suggests that decoupled farm payments can both decrease a farmer's risk aversion making them more likely to look for credit to invest in the farm business and also increase the probability of being granted loans from lenders.

Finally, overall farming attitudes were found to be a significant driver for decisions pertaining to credit use. Specifically, business orientated objectives provide a prime motivation for farmers to obtain credit. It could be that more business orientated farmers see debt as a means of increasing the long run profitability of their farm business. The results also suggest that despite the introduction of decoupled payments farmers still retain a productivist mindset and are reluctant to leave land idle. That said, productivist attitudes were not found to have a statistically significant impact on the probability of accumulating debt. On the other hand, farmers who strongly value the benefits of farm relative to other types of work were less likely to be in debt. The primary motivation for these farmers may not be financial objectives but rather the lifestyle or social goals associated with farm work.

In summation, the results presented here would suggest that in addition to economic factors, the overall values and attitudes of the farmer are likely to be important determinants of farm behaviour. In other words, it is likely that social and psychological factors in addition to economic variables will influence farmers' decision-making when it comes to the accumulation of debt. From a policy perspective obtaining a more complete understanding of the role of farming attitudes and motivations not just in relation to farm credit use but also in explaining farm behaviour more generally will help the design of more effective and efficient policies and programmes.

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List of tables

Table 1: Data for model of farming debts

Variable	Description	Mean	Min	Max
Debt	1 = No debt associated with the farm business, 2 = Lightly in debt, 3 = heavily in debt.	1.57	1	3
Age under 45	1 aged between 15 and 45, 0 otherwise.	.258	0	1
Education	1 = completed primary, 2 = some secondary, 3 = completed secondary, 4 = professional qualification to diploma level, 5 = University degree, 6 = Postgraduate education.	2.5	1	6
Successor	Likelihood of having a farm successor: 1 = Definitely, very likely, likely, 0 = not sure, 5 = unlikely, 6 = definitely not.	.60	0	1
Single farm payment	1 = individuals receiving more than €10,000 worth of decoupled payments per annum, 0 = individuals receiving less than €10,000 per annum.	.547	0	1
Dairying	1 = dairy farmers, 0 otherwise.	.202	0	1
Farm size	1 = <10 ha, 2 = 10-25 ha, 3 = 25-50 ha, 4 = 50-75 ha, 5 = 57-100 ha, 6 = 100-150 ha, 7 = 150 plus.	3.06	1	7
Increase production	1 = aim to increase production over the next 5 years, 0 = maintain current levels or reduce output.	1.65	0	1
Profit orientation	Factor variable measuring the degree to which principal farm operators feel profit orientated objectives and activities are important.	0	-3.35	2.06
Productivist	Factor variable measuring the degree to which principal farm operators feel that the full utilisation of land for maximising output is important.	0	-2.99	2.24
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	-4.64	2.20

Table 2: Factor loadings – farming attitudes (values > .4 are highlighted in bold)

	Profit	Productivist	Lifestyle	Mean scores
It is important to visit other farms to look at their methods	0.712	0.066	0.193	7.92
To be successful in farming it is important for me to adopt and uptake new technologies	0.664	0.05	0.057	7.52
It is important not to be afraid of adopting new farming practices	0.662	0.37	0.024	8.33
It is important to have the best livestock/crops/pastures	0.635	0.355	0.163	8.56
The main goal from farming should be to maximise profits	0.615	0.15	0.175	7.77
Farm production is the thing to take most pride in	0.522	0.433	0.267	8.3
It is important not to leave farm land idle	0.337	0.703	0.098	8.86
I believe that it is important that Ireland is self sufficient when it comes to producing food	0.213	0.719	0.174	8.38
It is a waste leaving farm land idle and not using it to produce agricultural goods	0.134	0.674	0.336	8.6
More of our land should be used for producing food	0.086	0.787	-0.066	7.9
I enjoy farming much more than I would other potential sources of employment	0.183	0.194	0.805	8.35
I could make more money in other employment but I would miss farming too much to give it up	0.172	-0.038	0.541	8.36
Farming is a more rewarding job in terms of quality of life, independence, lifestyle than it is in terms of money	0.065	0.23	0.814	6.92
<i>Eigen values</i>	4.75	1.32	1.21	

Extraction method: principal component analysis, Rotation method: Varimax with Kaiser normalisation

Table 3: Ordered logit model examining factors affecting level of debt on farming households

Debt	Coef.	Std. Err.	p-value	e^{^b}	e^{^b}StdX	SDofX
Age under 45 (individuals aged over 45 is the reference category)***	0.60	0.24	0.01	1.83	1.31	0.44
Education**	0.31	0.10	0.00	1.36	1.38	1.05
Successor (unlikely to have a farm successor is the reference category)*	0.30	0.21	0.15	1.35	1.16	0.49
Farm size***	0.30	0.09	0.00	1.35	1.49	1.33
Single farm payment***	0.94	0.24	0.00	2.57	1.60	0.50
Dairy (Mainly livestock, tillage and other farm systems is the references category)**	0.57	0.24	0.02	1.76	1.27	0.42
Increase production (farmers who intend to maintain the same level of production or reduce output over the next 5 years is the reference category) ***	0.26	0.10	0.01	1.30	1.31	1.03
Lifestyle **	-0.24	0.10	0.02	0.79	0.78	1.01
Profit orientation*	0.18	0.10	0.09	1.19	1.20	1.02
Productivist	-0.02	0.10	0.87	0.98	0.98	1.01