

# Rural Economy & Development Programme

## Working Paper Series

Working Paper 12-WP-RE-02

### The role of non-pecuniary benefits in the labour allocation decision of farmers.

Peter Howley,<sup>1\*</sup> Emma Dillon<sup>2</sup> and Thia Hennessy<sup>1</sup>

<sup>1</sup> Rural Economy Development Programme, Teagasc, Athenry, Co. Galway.

<sup>2</sup> Rural Economy Development Programme, Teagasc Food Research Centre, Ashtown, Dublin 15.



**For More Information on the REDP Working Paper Series**

**Email:** [Cathal.odonoghue@teagasc.ie](mailto:Cathal.odonoghue@teagasc.ie),

**Web:** [www.agresearch.teagasc.ie/rerc/](http://www.agresearch.teagasc.ie/rerc/)

**REDP**

## **The role of non-pecuniary benefits in the labour allocation decision of farmers.**

**Peter Howley, \* Emma Dillon and Thia Hennessy**

### **Abstract**

Previous research has primarily focused on the impact of economic variables in explaining the off farm labour allocation decisions of principal farm operators. This study finds attitudes regarding the non-pecuniary benefits associated with the farming lifestyle also significantly affect behaviour by acting as a strong disincentive to farmers towards working off farm. This may suggest that even if economic returns are greater in the off-farm labour market, farmers may not supply additional labour off farm. We also employed separate models of off-farm labour market participation and off-farm labour supply and found certain variables such as a farm operator's age and the level of diversification undergone by the farm business affect off farm labour market participation and hours supplied differently.

*Keywords:* Off farm labour, farming attitudes, non-pecuniary benefits, Ireland

Copyright 2012 by Peter Howley, Emma Dillon and Thia Hennessy. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies. Article to be referenced as: Howley, P., Dillon, E. and Hennessy, T. (2012) The role of non-pecuniary benefits in the labour allocation decision of farmers. Available at: <http://www.agresearch.teagasc.ie/lerc/workingpapers.asp>

\* Corresponding Author: Email: [peter.howley@teagasc.ie](mailto:peter.howley@teagasc.ie)

## 1. Introduction

Off farm employment now has an important role in ameliorating the effects of relatively low agricultural incomes and in effect enabling farm families to remain on the land and to retain an effective link with agriculture (Keeney and Matthews, 2000; Kimihi and Nachlieli, 2001). As noted by Huffman (1998), as agriculture continues to adjust to new farm and trade policies as well as new technologies a better understanding of the economics of time allocation will hold important implications for the well being of farm people. Furthermore, farmers' responsiveness to local labour market conditions and how that responsiveness changes as demographic factors change will affect the design and effectiveness of government programs (Howard and Swidinsky, 2000).

The objective of this paper is to provide new econometric evidence relating to the supply of off-farm labour by principal farm operators. A double hurdle model is formulated to examine the off-farm labour supply decisions of principal farm operators as it allows the joint modelling of (i) the decision whether or not to participate in the labour market; and (ii) the amount of time the participant allocates to off-farm work. To date, research on the off-farm employment decisions of farm operators has been dominated by an analysis of the impact of economic variables. This study extends previous work by specifically examining the role of perceptions regarding the non-pecuniary benefits associated with farm relative to non-farm work on off farm labour allocation choices. The specific hypothesis explored in this article is that the presence of a variety of non-pecuniary benefits associated with the farming lifestyle acts as a strong disincentive to principal farm operators in taking up off-farm employment. In other words, farmers may have an incentive to continue with on farm labour even when they can achieve much greater economic returns in alternative employment.

Previous research has shown that a substantial proportion of farmers operate at a market loss (see Hennessy et al. 2005; Hoppe and Banker, 2006) which suggests that there could be a variety of non-pecuniary benefits associated with farm work. It has been suggested 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). Vanclay (2004) asserts that farmers seek to make a reasonable income with each farmer defining what is reasonable for themselves and that the additional lifestyle benefits associated with farming compensate farmers for those times when income may be less than what they could achieve in other endeavours. Key (2005) describe how attributes associated with farming such as independence and pride associated with business ownership are valuable to farmers and these attributes may not be observable in other types of employment. Outside of agriculture it has been widely reported that the self employed report much greater levels of satisfaction with their jobs (Hamilton, 2000).

Recent research has documented the impact of personal characteristics of the farm operator such as both age and education on off farm labour allocation decisions (Lass and Gempesaw, 1992; Howard and Swidinsky, 2000). Structural farm factors have also been found to have a significant effect with farm size in particular found to be negatively associated with off farm labour supply (Lass et al., 1989; Hennessy and Rehman, 2008). Additionally, dairy farmers have generally been found to work less off farm than other farm types (Hennessy and Rehman, 2008). The effect of geographic characteristics has also been widely explored. In particular, the proximity of farms to areas with high population densities has been found to have a positive effect on off farm labour supply as these are likely to present more non-farm job opportunities than sparsely populated communities (Huffman 1980; Weersink 1992; Lim-Applegate et al. 2002). Finally,

government payments have also been found to effect off-farm labour supply (Mishra and Goodwin, 1997; El-Osta et al., 2004; 2008; Key and Roberts, 2009).

To date, research in this area has generally not considered the role of non-pecuniary attributes in explaining farmers' off farm labour market behaviour. One study which does provide some empirical support for the effect of non-pecuniary factors is that by Key and Roberts (2009). Using data from three farm household surveys the study found a large differential between the on farm and off farm hourly wage rate which as the authors outline suggests the possibility of substantial non-pecuniary benefits from farming. This study adds to this work by examining farmers' perceptions regarding the non-monetary benefits associated with farm relative to non farm work and modelling the impact of these perceptions on the off farm labour allocation decisions of farm operators. More specifically, using farmers' response to various attitudinal statements, this study derives a variable representing the extent to which a principal farm operator perceives there to be a variety of non-pecuniary benefits from farming. Separate models are then developed to examine the effect of this variable on off farm labour market participation and off farm labour supply. Employing separate models of off farm labour market participation and off farm labour supply as opposed to a single equation model has the added advantage of allowing us to ascertain if certain variables can affect off farm labour market participation and hours supplied differently.

## **2. Theoretical model**

The labour allocation decisions of farm operators are usefully viewed through an agricultural household model that integrates agricultural production, consumption and labour supply decisions into a single framework. The individual farm operator is assumed

to allocate time to farm work, off-farm work, and leisure so that the marginal values of time devoted to the activities are equal. Since the principal farm operator provides the majority of total on farm family labour it is likely that they derive the bulk of any potential non-pecuniary benefits that may exist. As such we simplify the analysis by focusing on the labour allocation decisions of the principal farm operator and hence ignoring the potential interdependence of the labour allocation decision between the operator and spouse (although the spouse's off-farm work is considered directly). A brief overview of the agricultural household model is given below (see Huffman (1991), Mishra and Goodwin (1997) and Weersink et al. (1998) for a more detailed overview of the agricultural household model). A farm operator is assumed to act in order to maximise his utility function,  $U$  which is a function of consumption  $C$  and Leisure time  $L$ . That is:

$$\text{Maximise } U = f(C,L) \quad (1)$$

subject to

$$T = L + O + F, \quad O \geq 0, \quad (2)$$

$$CP_c = WO + Y, \quad (3)$$

$$W = f(H) \quad (4)$$

Here utility is maximized subject to time and budget constraints. A farmer's total time endowment  $T$  is finite and is assumed to be allocated between leisure ( $L$ ), off-farm work ( $O$ ) and farm work ( $F$ ) so as to maximize utility. The time allocated to leisure and farm work is positive but the time allocated to off-farm work may be zero, hence the inequality in equation (2). Total utility is maximised by choosing hours of farm labour, off-farm labour and leisure so that the marginal utilities of these hours, in their alternative uses, are equal. Consumption goods, which are the reward for work either on or off the farm, are

bought at a price  $P_c$ . The total amount spent on consumption goods is constrained by the amount earned from farm income ( $Y$ ) and off farm income ( $WO$ ). Off farm income is the product of the wage rate ( $W$ ) and the hours worked off farm ( $O$ ). The off-farm wage rate  $W$  that the farm operator receives is a function of  $H$ , the farmer's human capital.

The decision to participate in off-farm employment is binary; individuals take up off-farm work when the wage offered exceeds their reserve wage rate, so that

$$P(O_i = 1) = P(W_r < W^*) = \beta X \quad (5)$$

Here  $P(O_i=1)$  is the probability of  $O_i=1$ , that is participation in off-farm employment which occurs if the reserve wage ( $W_r$ ) is less than the offered wage ( $W^*$ ). This in turn is a function of a vector of exogenous variables ( $X$ ) including potential non-pecuniary benefits from farm work that influence the latent reserve and therefore the participation decision. The amount of time spent working off the farm is determined by the optimal levels of leisure hours and farm work hours such that:

$$O = T - L - F = f(W^*, Y, X) \quad (6)$$

Here the number of hours supplied to off-farm work  $O$  is a function of the off-farm wage, farm income and other exogenous variables such as the non-pecuniary benefits from farming.

One potential problem with developing a model of labour supply is that many operators are not employed off-farm. Modelling labour supply in such circumstances will mean that all zero observations are interpreted as corner solutions, i.e. the farm operator is assumed

to be a participant who chooses not to work at the current level of exogenous variables such as wages (Matshe and Young, 2004). Operators who work off-farm may, however, be systematically different in terms of unobservable characteristics from those who do not work off-farm. As a result, estimating a model of off farm labour allocation in which participants and non-participants are combined may be subject to selection bias.

One solution to this problem is to model the off farm labour allocation choices of farm operators as two separate decisions: (i) whether or not to participate in the labour market; and (ii) for those who do engage in off farm employment the amount of time the participant allocates to off-farm work. This has the further advantage that it does not assume that the same variables that effect the decision to participate in the off-farm labour market will also have the same effect on off farm labour supply. Under this specification, if farm operators work off farm then a two stage process must have been completed. First, the individual has decided to participate in the labour market, and second, has allocated some time to this off-farm work. Essentially the model operates by assuming the existence of two latent variables:  $y_1$ , associated with the individual's decision to participate in the off-farm labour market, and  $y_2$ , associated with the decision of how many hours to work off farm. First the probability of engaging in off-farm work is:

$$y_1 = x_1 \beta_1 + u_1 \tag{7}$$

and conditional on clearing the first hurdle the number of hours supplied to off farm work can be specified as:

$$y_2 = x_2 \beta_2 + u_2 \tag{8}$$



Where  $x_1$  represents those variables used to explain the participation decision and  $x_2$  represents those variables used to explain the hours of work decision. In the survey, farmers were first asked to indicate if they had an off farm job. Those that gave a positive response were then given specific hours groupings (less than 10, 10-20, 20-30, 30-40, 40-50 and over 50 hours per week) and asked to indicate which one most accurately reflected the amount of time they spent working off farm. Given the structure of these variables a binary logit model was specified to determine what factors affected farmers decision to engage in off farm work and a Generalised Tobit Interval model was specified to examine the factors that affect the off farm labour supply of farm operators who cleared the first hurdle i.e. decided to engage in off farm work.

In the Tobit model the interval chosen by each individual is specified as  $y = \mu + \varepsilon$ . where  $\mu$  is the deterministic component and  $\varepsilon$  is the error term. It is assumed that  $\varepsilon \sim N(0, \sigma^2 I)$ . The Generalized Tobit Interval model employs a log-likelihood function adjusted to make provision for point, left-censored, right-censored and interval data. For individuals  $j \in C$ , we observe  $y_j$ , i.e. point data and for respondents  $j \in R$  are right censored; we know only that the unobserved  $y_j$  is greater than or equal to  $y_{Rj}$ . Finally respondents  $j \in I$  are intervals; we know only that the unobserved  $y_j$  is in the interval  $[y_{1j}, y_{2j}]$ . The log likelihood is given by:

$$\begin{aligned} \ln L = & -\frac{1}{2} \sum_{j \in C} y_j \left\{ \left( \frac{y_j - x\beta}{\sigma} \right)^2 + \log 2\pi\sigma^2 \right\} + \sum_{j \in L} y_j \log \Phi \left\{ \left( \frac{y_{Lj} - x\beta}{\sigma} \right) \right\} \\ & + \sum_{j \in R} y_j \log \left\{ 1 - \Phi \left( \frac{y_{Rj} - x\beta}{\sigma} \right) \right\} + \sum_{j \in I} y_j \log \left\{ \Phi \left( \frac{y_{2j} - x\beta}{\sigma} \right) - \Phi \left( \frac{y_{1j} - x\beta}{\sigma} \right) \right\} \end{aligned} \quad (9)$$

where  $\Phi ()$  is the standard cumulative normal and  $y_j$  is the weight of the jth individual.

### 3. Data

The data utilized 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. In relation to employment status, survey respondents were asked to indicate if they had an off-farm job. Those that indicated that they had an alternative source of employment were then given various categories in 10 hour intervals ranging from less than 10 to over 50 per week. As such the variable representing labour supply took the form of a categorical interval variable which was right censored at over 50 hours. Twenty eight percent of farm operators were engaged in off farm employment and of those working the median value of hours supplied was the 20-30 hour interval. Table 1 presents more detail in relation to the variables utilised in the labour participation and supply models.

Insert table 1 here

Farmers' perceptions regarding the non-pecuniary benefits associated with farm relative to non farm work were captured by including 3 attitudinal statements in the 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 factor analysis was employed on the various attitudinal statements which facilitated identification of underlying relationships among the multiple value items and provided a statistical test of the validity of the classification of our construct. 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 smaller 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 respondent's 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 results from the factor analysis of the attitudinal statements designed to capture perceptions regarding the non-pecuniary benefits associated with farm work along with their overall mean scores are presented in table 2. The three multiple value items had high factor loading coefficients on one factor (which we labelled as 'lifestyle') thus illustrating the unidimensionality of the derived construct. The individual factor scores measure the extent to which farm operators feel that there are a variety of non-

pecuniary benefits associated with farm work and were used as an explanatory variable to examine their impact on the labour allocation decisions of farm operators.

Insert table 2 here

#### **4. Results**

On the whole, farm operators had a strong tendency to support the suggestion that they are a number of non-monetary benefits associated with the farming experience as evident by the high means scores on each of the attitudinal statements (see table 2). Apart from an overall high mean score, a large number of farm operators completely agreed with these statements i.e. gave these statements a score of 10 on the 10 point scale. For instance, thirty seven percent of respondents completely agreed with the statement “Farming is a more rewarding job in terms of quality of life, independence, lifestyle, than it is in terms of money”. Forty and 24 percent of farmers completely agreed with the statements: “I enjoy farming much more than I would other potential sources of employment” and “I could make more money in other employment but I would miss farming too much to give it up” respectively.

Table 3 presents the average mean level of agreement for each of the attitudinal statements across individual farm types. While all farm types had a strong level of agreement with each of these statements there were some interesting observed differences in overall mean scores. The farm type with the strongest level of agreement was dairy farmers which were closely followed by tillage farmers. These farm types would be relatively more intensive in nature than livestock farms (cattle or sheep) and particularly in the case of dairy would require a high degree of commitment in terms of time and

labour from the principal farm operator. It could be that individuals who are willing to commit relatively high levels of labour input to these farm activities are in turn more likely to perceive that there are extra non-pecuniary benefits associated with farming. In other words, it is the presence of these non-monetary benefits associated with farm relative to non farm work that makes these individuals more likely to make the commitment necessary to obtain a living from these relatively labour intensive systems of farming.

Insert table 3 here

The results of the logit model examining factors affecting off farm labour market participation can be seen in table 4 with the results of the off farm labour supply model following in table 5. To facilitate the interpretation of the relevant size and magnitude of the effect of the explanatory variables on the probability of engaging in off-farm work, table 4 also presents the odds ratios 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 engaging in off farm work. 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 relation to age, the results in table 4 suggest that individuals who are between the ages of 35 and 50 are over twice (2.27) as likely to engage in off farm work than individuals aged 50 years or more. The effect of being between the ages of 15 and 35 is significantly greater as this group of farm operators are, *ceteris paribus*, over three (3.07) times more likely to participate in off farm work. For a one standard deviation increase in the level of

education the odds of engaging in off farm work are 1.68 times greater, holding all other variables constant. Farm operators with children are 1.66 times more likely to have an off farm job and similarly farm operators who have a spouse in off farm employment are themselves over three times (3.49) more likely to participate in the off farm labour market. In relation to farm type, dairy farmers are 0.38 times more likely to have an off farm job or put another way dairy farmers are 2.63 ( $1/0.38$ ) times less likely to engage in off-farm employment. A one standard deviation increase in the stocking rate which corresponds to an increase of 23 farm animals decreases the odds of off farm employment by a factor of 0.74. Similarly a one standard deviation increase in farm size decreases the odds of engaging in off farm work by 0.58. Farm operators who have diversified the farm business are 1.59 times more likely to engage in off-farm work. Farm indebtedness was not found to have a statistically significant impact on off farm labour market participation or off farm labour supply.

The derived variable 'lifestyle' held as representing the extent to which farm operators perceive there to be a range of non-pecuniary benefits associated with farming has a statistically significant negative effect on the probability of engaging in off-farm work. A one standard deviation increase in the variable 'lifestyle', decreases the odds of having an off farm job by a factor of 0.69. To provide a further illustration of the effect of this variable on labour market participation we can compare the predicted probability of engaging in off farm work for the individual with the highest and lowest scores on this attitudinal construct holding all other variables at their means. The individual with the lowest factor score had a mean predicted probability of participating in the labour market of 0.61 whereas the individual with the highest score had a predicted probability of 0.16

or in other words we would expect 16 percent of individuals with these characteristics to engage in off farm work.

In terms of off farm labour supply, age and the variable representing the level of diversification undergone by the farm business were found to have a different effect to that observed in the off farm labour market participation model. Specifically, once respondents clear the first hurdle (i.e. have made the decision to participate in the off farm labour market) the results in table 5 would suggest that individuals aged between 35 and 50 are likely to work more hours off farm than individuals aged 15-35. The variable representing the extent of farm diversification was found to be negatively associated with off farm labour supply which was opposite to the effect observed in the off farm labour market participation model.

Insert table 4 here

Insert table 5 here

## **5. Discussion**

The results stemming from the off farm labour market participation and labour supply models illustrate the impact of a wide range of factors on the labour allocation decisions of farm operators. As expected older farm operators are less likely to participate in the off-farm labour market. This is in keeping with the life cycle earnings hypothesis which suggests that young farmers are generally more willing to do non farm work to finance additional assets, whereas older farmers may have sufficient income from other sources (Lim-Applegate et al., 2002). The larger coefficient for the dummy variable representing those aged 15-35 would suggest a non-linear relationship between age and off-farm labour market participation rates. That is, while both individuals aged 15-35 and 35-50

are more likely to participate in off-farm employment than those aged over 50, this effect is greater for the relatively younger age category. In relation to labour supply the relative magnitude of both age coefficients change. That is, the effect of being aged 35-50 on the amount of hours supplied to the off farm labour market is now much greater than being aged 15-35. One possible explanation is that young farmers (e.g. those aged 15-35) are more likely to engage in off farm work in keeping with the life-cycle earnings hypothesis, but once that decision is made individuals in the age group 35 to 50 are likely to supply more hours as they may perhaps enjoy higher wage rates due to greater levels of work experience.

Education was found to have a positive effect on off farm labour market participation and supply which supports previous findings by Lim-Applegate et al. (2002) and Lass and Gempesaw (1992). Farm operators with spouses with an off-farm job or income are also more likely to participate in off-farm employment which again is supportive of previous research (Lass and Gempesaw 1992; Howard and Swidinsky, 2000). It could be that having a spouse with alternative income from outside the farm may be indicative of a family receptive to opportunities outside of agriculture (Howard and Swidinsky, 2000). The presence of children was also found to have a positive effect on the probability of a farmer participating in the off-farm labour market. It seems reasonable to hypothesise that households with children would face tighter budget constraints and be under relatively more pressure to obtain extra income from outside the farm. In relation to labour supply, the sign on the coefficients representing farm operators with children and those who have spouses with an off farm job or income were the same as that observed in the labour participation model although not statistically significant. However, given the



relatively small sample size in the labour supply model it is possible that with a larger number of observations one or both of these variables could be statistically significant.

Dairy farmers were less likely to engage in off farm work and those that do were also likely to work less hours than other farm types which would be in line with previous research (Lim-Applegate et al., 2002; Hennessy and Rehman, 2008). Dairy farming requires the presence of a farmer at certain times of the day and therefore they do not have a lot of flexibility with their time. In addition, the marginal productivity of dairy farmers is generally higher than that observed on other farm types. Stocking rate was also negatively associated with participation which probably captures the fact that farms with higher stocking rates are relatively more intensive with farmers having less time to spend on non-farm activities. The final farm structural variable examined was farm size which was also found to be negatively associated with off farm labour market participation and off farm labour supply. This perhaps reflects the fact that operators on relatively larger farms would have both less time and need to engage in off farm employment.

Farmers who have diversified their farm business were more likely to engage in off farm employment, but once participating in the off-farm labour market were likely to have lower levels of off farm labour supply. One possible explanation here is that farmers who have diversified are under greater financial pressure to obtain alternative sources of income to fund any investments accruing from their diversification activity and as such more likely to seek off farm employment. Once in the off farm labour market they are, however, likely to choose options that minimise the amount of hours spent on off farm work due to perhaps extra time constraints associated with their diversification activity.

In addition to a consideration of economic factors, farm operators may consider differences in the non-pecuniary benefits associated with farm and non-farm work. More precisely, even in the face of greater economic returns in the off-farm labour market, farm operators could choose to allocate more time to on farm work due to the extra non-pecuniary benefits obtained. The analysis presented here would suggest that farmers do indeed generally perceive that there are extra non-pecuniary benefits associated with farm as opposed to non-farm work. This perception, in turn, was also shown to act as a disincentive for farm operators in terms of off farm labour market participation and supply. 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 farm work if they take up off farm employment.

## **6. Conclusion**

This study examined the impact of a diverse range of factors on the labour allocation decisions of principal farm operators. Separate models of off-farm labour market participation and supply were employed which corrected for potential selection bias as well as accounting for potential differences in the effect of variables on both off farm labour market participation and off farm labour supply. Age was found to be negatively related to off farm labour market participation in that the probability of having an off-farm job decreased with age. In contrast to the effect observed in the off farm labour market participation model, individuals aged 35 to 50 were much more likely to allocate hours to off farm work than the younger age cohort (15-35). This perhaps captures the fact that once the decision to participate in off farm employment is taken, the relatively older age group will generally enjoy higher wages and thus have a greater incentive to

allocate additional hours to off farm labour. Education was positively related with off farm labour market participation and supply which would suggest that, for this sample of farmers at least, the increase in the marginal returns from education is greater for off-farm rather than non-farm work.

Farm household characteristics also strongly affected off farm labour market participation decisions as the presence of children and having a spouse with an off-farm job or income both increased the probability of engaging in off-farm work. Similarly, structural farm factors such as farm size, farm system and stocking rate were also found to have a significant effect on farm operators off farm labour allocation decisions. Whether a farm operator had diversified the farm business also affected off farm labour market participation and supply but in opposite directions. More specifically, farm diversification increased the probability of a farmer engaging in off farm work but decreased off farm labour supply. It could be that extra investments made in relation to diversification explain the positive impact on off farm labour market participation but additional time constraints explain the finding in relation to off farm labour supply.

In addition to an examination of the effect of demographic and structural farm factors this study extended previous research by examining the role of perceptions regarding the non-pecuniary benefits from farming on the labour allocation decisions of principal farm operators. The results suggest that farmers, for the most part, feel that there are a variety of non-pecuniary benefits associated with farm work. These perceptions, in turn, acted as a strong disincentive to farmers towards working off farm. Failing to take account of the role of non-pecuniary benefits may mean that the supply response from farmers in response to changes in the off farm labour market such as an increase in the off farm

wage will be overestimated. Due to the non-monetary benefits associated with the on farm work experience many farmers may be reluctant to allocate their time to off farm work even if the marginal returns to off farm income are higher. That is, these non-monetary benefits may act as a compensatory mechanism to farmers even if they could obtain higher incomes in other endeavours.

In relation to future work it would be useful to determine which non-pecuniary attributes are most valuable to farmers. Some possibilities here include the utility derived from being self-employed, the prestige associated with land ownership, the benefits from working outdoors/nature and the benefits accruing from social interaction with other farmers and individuals in the agricultural sector. Finally, it would also be useful to explore the effect of perceptions regarding the non-pecuniary benefits from farming on farmers' behaviour across a wide range of farm activities. It is likely that non-pecuniary attributes in addition to economic variables will influence farmers' decision-making. It would be useful, therefore, to incorporate perceptions regarding the non non-pecuniary benefits from farming in economic models of farm behaviour as this could lead to much more accurate predictions of farmers' response to policy changes.

## References

- Ackerman, N., G. Jenson, and D. Bailey. 1989. Major sources of satisfaction for farm families. *Utah Science*, 50: 134–142.
- Barlett, P.F. 1991. "Motivations of Part-time Farmers". In M.C Hallberg, J.L. Finders, and D.A Lass, eds *Multiple Job Holding Among Farm Families*. Ames IA: Iowa State University Press.

- Blamey, R.K., J.W. Bennett, and M. Morrison. 1999. Yea-saying in contingent valuation surveys. *Land Economics*, 75(1): 126–141.
- El-Osta, H.S., A.K. Mishra, and M.J. Morehart. 2008. Off-farm labor participation decisions of married farm couples and the role of government payments. *Review of Agricultural Economics*, 30(2): 311-332.
- El-Osta, H.S., A.K. Mishra, and Ahearn, M.C. 2004. Labor supply by farm operators under ‘Decoupled’ farm program payments. *Review of Economics of the Household*, 2(4): 367-385.
- Hamilton, B.H. 2000. Does Entrepreneurship pay? An empirical analysis of the returns of self-employment. *Journal of Political Economy*, 108(3): 604-631.
- Hennessy, T., and T. Rehman. 2008. Assessing the impact of the ‘Decoupling’ Reform of the Common Agricultural Policy on Irish farmers’ off-farm labour market participation decisions. *Journal of Agricultural Economics*, 59(1): 41-56.
- Hennessy, T., and F. Thorne. 2005. How Decoupled are Decoupled Payments? The evidence from Ireland. *Eurochoices*, 4(1): 30-35
- Herrmann, V., and P. Uttitz. 1990. If only I didn’t enjoy being a farmer!: Attitudes and opinions of monoactive and pluriactive farmers. *Sociologia Ruralis*, 30(1): 62–75.
- Hoppe, R.A., and D.E. Banker. 2006. Structure and finances of U.S. Farms: 2005 family farm report. *Economic Information Bulletin No. (EIB-12)* May.
- Howard, W., and M. Swidinsky. 2000. Estimating the of-farm labour supply in Canada. *Canadian Journal of Agricultural Economics*, 48(1): 1-14.
- Huffman, W. 1980. Farm and off-farm work decisions: The role of human capital. *Review of Economics and Statistics*, 62(1), 14–23.
- Huffman, W., and M. Lange. 1989. Off-farm work decisions of husbands and wives: Joint decision making. *Review of Economics and Statistics*, 71(3): 471–480.

- Huffman, W.E. 1991. "Agricultural household models: Survey and critique" in Hallberg, M.C., J.L. Findeis, D.A. Lass (eds.) Multiple Job holding among Farm Families Iowa State Univ. Press, Ames, IA pp 79-111
- Huffman, W.E., and H. El-Osta. 1998. "Off-Farm Work Participation, Off-farm Labour Supply and On-Farm Labour Demand of U.S. Farm Operators" Paper presented at the 1998 Summer AAEA meeting, Salt Lake City, UT.
- Keeney, M., and A. Matthews. 2000. Multiple job holding – explaining participation in off-farm employment, labour demand and labour supply of Irish farm households. Contribution to the 'Work on and off the Farm' Symposium, 17th April 2000. Available at: [http://www.aesi.ie/aesidownloads/9900/11\\_keeney.pdf](http://www.aesi.ie/aesidownloads/9900/11_keeney.pdf)
- Key, N. 2005. How much do farmers value their independence? *Agricultural Economics*, 33: 117-126.
- Key, N., and M.J. Roberts. 2009. Nonpecuniary benefits to farming: Implications for supply response to decoupled payments to decoupled payments. *American Journal of Agricultural Economics*, 91(1): 1-18.
- Kimhi, A., and N. Nachlieli. 2001. Inter-generational succession on Israeli family farms'. *Journal of Agricultural Economics*, 52(2): 42–58.
- Kline, J., and D. Wichelns. 1998. Measuring heterogenous preferences for preserving farmland and open space. *Ecological Economics*, 26: 211-224.
- Lass, D., J. Findeis, and M. Hallberg. 1989. Off-farm labor employment decisions by Massachusetts farm households'. *Northern Journal of Agricultural Resource Economics*, 149–159.
- Lass, D., and C.M. Gempesaw. 1992. The Supply of Off-farm Labor: A Random Coefficient Approach. *American Journal of Agricultural Economics*, 74(2): 400-411.

- Lim-Applegate, H., G. Rodriguez, and R. Olfert. 2002. Determinants of non-farm labor participation rates among farmers in Australia. *The Australian Journal of Agricultural and Resource Economics*, 46(1): 85-98.
- Matshe, I., and T. Young. 2004. Off-farm labour allocation decisions in small-scale rural households in Zimbabwe. *Agricultural Economics*, 30(3): 175-186.
- Mishra, A.K., and B.K. Goodwin. 1997. Farm income variability and the supply of off-farm labour. *American Journal of Agricultural Economics*, 79(3): 880-887.
- Weersink, A. 1992. Off-farm labour decisions by Ontario swine producers. *Canadian Journal of Agricultural Economics* 40(2): 235-251
- Weersink, A., C. Nicholson and J. Weerhewa 1998. Multiple job holdings among dairy farm families in New York and Ontario. *Agricultural Economics* 18(2): 127-144
- Willock, J., Deary, I. J., Edwards Jones, G., Gibson, G., McGregor, M.J., Sutherland, A., Dent, J.B., Morgan, O., Grieve, R. (1999a) The Role of Attitudes and Objectives in Farmer Decision Making: Business and Environmentally- Oriented Behaviour in Scotland. *Journal of Agricultural Economics*, 50(2): 286-303.
- Willock, J., Deary, I. J., McGregor, M. J., Sutherland, A., Dent, J. B., Edwards Jones, G., Grieve, R, Morgan, O., Gibson, G. and Austin, E. (1999b). Farmers' attitudes, objectives, behaviors, and personality traits: The Edinburgh study of decision making on farms. *Journal of Vocational Behavior*, 54(1): 5-36.
- Vanclay, F. 2004. Social principles for agricultural extension to assist in the promotion of natural resource management. *Australian Journal of Experimental Agriculture*, 2004, 44: 213-222.

**List of tables**

*Table 1: Data for labour allocation models*

<i>Variable</i>	<i>Description</i>
Age 15-35	1 aged between 0 and 35, 0 otherwise
Age 35-50	1 aged between 35 and 50, 0 otherwise
Education	1 = completed primary, 2 = some secondary, 3 = completed secondary, 4 = professional qualification to diploma level, 5 = University degree, 6 = Postgraduate education
Children	1 has children, 0 otherwise
Spouse working	1 spouse has an off-farm job, 0 otherwise
Dairying	1 diary farmers, 0 otherwise
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
Stocking rate	No of livestock (cattle or sheep)/Farm size
Diversification	1=farmers who report that they have diversified a great deal or diversified somewhat, 0 = have not diversified or don't know
Debt	1 = No debt associated with the farm business, 2 = Lightly in debt, 3 = heavily in debt
Lifestyle	Variable measuring the degree to which principal farm operators feel there are extra non-pecuniary benefits associated with farm relative to farm work

*Table 2: Factor loadings*

	<i>Factor scores</i>	<i>Mean scores</i>
<i>Lifestyle</i>		
Farming is a more rewarding job in terms of quality of life, independence, lifestyle than it is in terms of money	.848	8.36
I enjoy farming much more than I would other potential sources of employment	.856	8.35
I could make more money in other employment but I would miss farming too much to give it up	.514	6.92

*Extraction method: principal component analysis*



*Table 3: Level of agreement or disagreement on a scale from 1 to 10 where 1 means you completely disagree and 10 means you completely agree (average mean scores)*

	<i>Cattle (n= 324)</i>	<i>Sheep (n=88)</i>	<i>Dairy (n=123)</i>	<i>Tillage (n=31)</i>	<i>Other (n=41)</i>
Farming is a more awarding job in terms of quality of life, independence, lifestyle, than it is in terms of money	8.22	7.88	9.04	8.96	7.92
I enjoy farming much more than I would other potential sources of employment	8.12	8.03	9.13	9.1	7.88
I could make more money in other employment but I would miss farming too much to give it up	6.96	6.6	7.09	6.97	6.84

*Table 4: Logit model examining factors affecting off farm labour market participation of principal farm operators*

<i>Off farm job</i>	<i>Coef.</i>	<i>Std. Err.</i>	<i>Odds ratio</i>	<i>Odds StdX</i>	<i>SDofX</i>
Age 15-35 (over 50 is the reference category)***	1.121	0.432	3.069	1.382	0.289
Age 35-50 (over 50 is the reference category) ***	0.824	0.273	2.279	1.438	0.441
Education ***	0.516	0.117	1.676	1.765	1.100
Children (no children is the reference category) *	0.504	0.264	1.656	1.274	0.480
Spouse income (spouse does not have an off-farm job or income is the reference category) ***	1.250	0.251	3.490	1.768	0.456
Dairying (non dairy farmers is the reference category) ***	-0.963	0.337	0.382	0.674	0.410
Stocking rate **	-0.013	0.006	0.987	0.743	23.258
Farm size ***	-0.404	0.102	0.667	0.579	1.351
Diversification (have not diversified is the reference category) *	0.462	0.255	1.588	1.233	0.453
Debt	-0.280	0.211	0.756	0.832	0.658
Lifestyle ***	-0.362	0.112	0.696	0.692	1.016
N = 525					
LR chi2(11) = 140.24					
Prob > chi2 = 0.000					

\*\*\* significant at 1% level, \*\* significant at 5% level, \* significant at 10% level

*Table 5: Generalised Tobit Interval model of off farm labour supply of principal farm operators*

<i>Hours supplied</i>	<i>Coef.</i>	<i>Std. Err.</i>
Age 15-35 (over 50 is the reference category)	-0.074	2.913
Age 35-50 (over 50 is the reference category) ***	5.131	1.949
Education **	1.887	0.818
Children (no children is the reference category)	-2.993	2.058
Spouse income (spouse does not have an off-farm job or income is the reference category)	1.704	1.824
Dairying (non dairy farmers is the reference category) **	-7.156	2.942
Stocking rate	-0.021	0.039
Farm size *	-1.407	0.762
Diversification (have not diversified is the reference category) ***	-5.964	1.858
Debt	1.448	1.620
Lifestyle *	-1.393	0.797
N = 151		
LR chi2(11) = 38.48		
Prob > chi2 = 0.000		

\*\*\* significant at 1% level, \*\* significant at 5% level, \* significant at 10% level