The CAP and national priorities within the EU budget after 2020

INSTITUTE OF AGRICULTURAL
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Abstract

The economic sustainability of farm households is frequently dependent on the availability of off-farm employment. This paper uses farm-level data to examine the impact of the Common Agricultural Policy (CAP) direct payment scheme, farm household characteristics and agricultural market conditions on farm households' labour allocation decisions in Ireland. Among other things, the hypothesis that decoupled direct payments induce farm household members to allocate more time to off-farm employment is tested. The analysis presented here suggests that decoupled direct payments are significantly and negatively associated with both the probability and amount of time allocated to off-farm work in the case of the farm operator. For married couples, the analysis finds a negative relationship between decoupled payments and the probability of both the farm operator and the spouse working in off-farm employment. Interestingly, decoupled payments have no significant relationship with the probability of the spouse only working in off-farm employment. This result corresponds to the finding of El-Osta et al. [2008] and suggests that decoupled payments tend to play a very limited role in explaining the off-farm employment decisions of the spouse. This analysis contributes to our understanding about the importance of off-farm labour in supporting farm household income. Furthermore, the analysis contributes to our understanding about the role of the farm spouse in contributing towards farm household income, the farm viability and the relationship between off-farm labour decisions and agricultural policy.

Keywords: off-farm labour supply, direct payments, probit model, multinomial logit model

JEL codes: J22, J43, Q12

9.1. Introduction

Off-farm employment by farmer operators and their spouses is a common feature of agriculture and farmers constitute a sizeable proportion of the rural labour force in many Member States of the EU. The growing phenomenon of off-farm employment has arisen out of a number of push and pull factors. For example, small farm size and poor and volatile farm incomes have contributed as push factors [Loughrey and Hennessy, 2016]. Growing rural labour markets with higher and more stable wage rates are among the main pull factors. Many of the factors affecting off-farm employment trends are explored in this paper. The determinants of off-farm employment strategies among married couples is given particular attention given that the off-farm employment decisions of the farm operator and the spouse may differ for a number of reasons.

This paper examines the impact of the Common Agricultural Policy's (CAP) direct payment scheme and agricultural market conditions on farm households' labour allocation decisions in Ireland. The case of Ireland provides an interesting setting for this analysis given the recessionary period from 2007 to 2012. Giannakis et al. [2018] explain that "understanding the factors affecting farmers" off-farm labour decisions during recessionary periods has significant implications for agricultural and rural development policy'. Along with Spain and Greece, Ireland experienced the largest declines in the employment rate among the OECD countries during the course of the economic recession from 2007 to 2012 and this manifested itself in declining opportunities for off-farm employment. The decoupling of direct payments occurred in 2005 and, therefore, prior to the onset of the economic recession. We first hypothesize that the decoupling of direct payments led to an increase in off-farm labour activity among farm operators. Second, we examine the impact of direct payments on off-farm employment strategies among the subset of farm households, which are led by married couples. The hypothesis is that the value of direct payments is negatively associated with the probability of a strategy whereby both the farm operator and the spouse are engaged in off-farm employment. These hypotheses are tested empirically and the results are discussed in the context of the impact of the CAP on farm employment and on the off-farm employment decisions of farmers.

9.2. Theoretical framework

A neoclassical household model based on utility maximisation is used to model farm households' labour allocation decisions. This model is the most common approach in the literature and stems from the seminal paper by Becker (1965). The model rests on the neo-classical assumption that households behave to maximise their utility function defined over consumption commodities. Lee [1965] was among the first to extend this labour-leisure model for the special case of farm operator households. Tokle and Huffman [1991] extended this model to deal with the labour supply decisions of couples.

In this paper, we deal with the labour allocation decisions of the farm operator (OP) and the spouse (SP) in the farm household. The utility function (*U*) is assumed to be a function of consumption (*C*) and leisure time (*L*) of both the operator and the spouse and is expressed by equation 1.

$$Maximise\ U = f\left(C, L_h^{OP}, L_h^{SP}, \tau\right) \tag{1}$$

The term τ refers to other household characteristics. Total hours of leisure equates to the sum of leisure of the operator and spouse in the following:

$$T_h^i = L_h^{OP} + L_h^{SP} \tag{2}$$

subject to the constraints:

$$\bar{T} = T_f^i + T_o^i + T_h^i \, , T_o^i \geq 0 \, , i = OP, SP \tag{3}$$

Equation 3 shows that the utility function is maximised subject to time constraints as the farmer's total time endowment $\bar{T}$ is finite and is allocated between leisure time of the operator and spouse T_h^i, off-farm work T_o^i and farm work T_f^i. In the case of agriculture, it can be assumed that time allocated to leisure and farm work is positive but for many farmers the time allocated to non--farm work is zero, hence the inequality in equation 3.

$$P_c C = \sum_i W_o^i \, T_o^i + \left(P_f \, Y_f - I_f \, X_f\right) + V \tag{4}$$

$$Y = f\left(T_f^{OP}, T_f^{SP}, X, \Phi\right) \tag{5}$$

$$W_o^i = W_o^i(\zeta^i, \psi) \tag{6}$$

Equation 4 shows that the utility function is maximised subject to budget constraints. The total household Consumption (*C*) is constrained by equating total consumption with total income, i.e. consumption cannot exceed income and savings do not exist. Income can be derived from the off-farm work income (W_o^i) the farm profit and the exogenous household wealth *V*, that is wealth that is not derived from farm or off-farm labour. The off farm income is due to the wage rate W_o^i multiplied by the off-farm hours T_o^i while the farm profit amounts to the price of farm goods produced P_f by the volume of production Y_f less the cost of production, i.e. the cost of farm inputs I_f by the volume of input X_f.

Equation 5 shows the production function where farm output Y is determined by the labour time of the farm operator T_f^{OP} and that of the spouse T_f^{SP}

along with capital and land inputs X and local or regional factors Φ, which may include climate or soil conditions. The farm operator and spouse face an off-farm wage rates W_o^i which are a function of ζ^i the farmer's human capital and ψ the local labour market conditions. The trade-off between time spent farming and time spent off the farm is conceptualised diagrammatically by Sumner [1982].

The decision to participate in off-farm employment is binary. Rational individuals are expected to participate when the off-farm wage offered exceeds their reservation wage. It is assumed that the farmer or spouse engages in off--farm employment where the offered wage exceeds the so-called reservation wage, i.e. where the offered wage exceeds the reservation wage $w_o^{i*} > rw_o^{i*}$. Conversely, the farmer does not engage in off-farm employment, if the reservation wage rw_o^{i*}exceeds the offered wage w_o^{i*}.

The probability of participating in off-farm work is estimated using a vector of exogenous variables X that are hypothesised to influence the latent reservation wage and off-farm wage rates and therefore the participation decision. Variables that increase the off-farm wage rate relative to the reservation wage increase the probability of off-farm work and the opposite is true for variables that decrease the off-farm wage rate. There are four alternative off-farm work strategies emerging from this model; only the farm operator works off-farm, only the spouse works off-farm, both work off-farm and neither spouse works off-farm.

In addition to these four strategies, we model the intensive margin of off--farm labour supply for the farm operator, i.e. the number of hours committed to off-farm work. The supply function for off-farm work is determined by the optimal level of leisure hours and off-farm work hours, as described in equation 7.

$$T_o^{OP} = \overline{T}^{OP} - T_f^{OP} - L_h^{OP} = F = f(w_o^{OP*}, P_f, I_f, V, \zeta^i, \psi) \quad (7)$$

The number of hours supplied by the farm operator towards off-farm work T_o^{OP} is a function of the off-farm wage w_o^{OP*}, farm profit, i.e. output less costs (*Pf* - *If*), exogenous household income *V*, the farm operator's human capital ζ^{OP} and local employment market conditions *Z*.

9.3. Methodology

In this section, we describe the econometric methodology used to model the off-farm labour supply of farm operators in Ireland. We follow this with a description of the methodology applied to model the choice of off-farm work strategy among married couples.

We first seek to identify the extent to which different factors contribute towards the hours of off-farm labour supply for farm operators in the Irish case. We wish to estimate the hours equation in the following:

$$OHRS_{it}^{*} = \beta_0 + \beta'_{1} X_{1it}^{*} + \varepsilon_{1it} \tag{8}$$

where: $OHRS_{it}^{*}$ represents the hours of off-farm labour and ε_{1it} is the regression error term. The term X_{1it}^{*} represents the independent variables and β'_{1} represents the coefficient parameter for these variables. Our chosen model is a fixed effects estimator. We, therefore, decompose the error term ε_{1it} into an unknown constant $\mathrm{v}_{1\mathrm{it}}$ which differs only across individuals and the random error term u_{1it} which is assumed to be independently and identically distributed over time and individuals

$$\varepsilon_{1it} = v_{1it} + u_{1it} \tag{9}$$

As this is a fixed effects model, we allow for correlation between the constant v_{1it} and the explanatory variables X_{1it}^{*} but we do not capture the effect of stable covariates.

Studies of off-farm employment typically involve situations whereby a large proportion of the population have zero reported off-farm labour hours and wages due to non-participation in off-farm employment. Our conceptual framework claims that these instances of non-participation are due to reservation wages being above offered wages, i.e. where $w_{it}^{r*} > w_{it}^{i*}$. The reservation wage w_{it}^{r*} is a latent variable where the latent model can be described as:

$$w_{it}^{r*} = \beta_0 + \beta' X_{it}^{*} + \varepsilon_{it} \tag{10}$$

where the observed binary participation in off-farm employment O_{it} can be summarised as:

$$O_{it} \begin{cases} 1\ if\ (w_o^i > w_{it}^{r*}) \\ 0\ if\ (w_o^i < w_{it}^{r*}) \end{cases} \tag{11}$$

Equation 8 includes only those observations where the hours of off-farm labour supply $OHRS_{it}$ are available, i.e. where the farm operators are employed off-farm. This may suggest the problem of sample selection bias. We can attempt to overcome this problem by first modelling the participation decision.

We use a random effects probit model for the off-farm participation decision O_{it}^{*}, whereby:

$$O_{it}^{*} = \exp(\beta_0 + \beta'_{2} X_{2i}^{*}) + \varepsilon_{2it} \tag{12}$$

where: O_{it}^{*} measures the probability of participation and ε_{2it} is the regression error term for this equation. The term X_{2i}^{*} represents the independent variables and β'_{2} represents the coefficient parameter for these variables. The error term ε_{2it} is decomposed into a time invariant individual effect v_{2it} and the random error term u_{2it} which is assumed to be independently and identically distributed over time and individuals.

$$\varepsilon_{2it} = v_{2it} + u_{2it} \tag{13}$$

Given that this is a random effects model, we therefore assume that there is no correlation between the individual effect v_{2it} and the explicit explanatory variables X_{2i}^{*}.

We can test whether or not sample selection bias is a problem in the first instance by using the error terms from both the participation and labour supply models. Both error terms may be correlated as they both contain information about the reservation wage. If the correlation coefficient suggests that the error terms, ε_{1it} and ε_{2it} are uncorrelated, then the hours equation can be estimated consistently by ordinary least squares. If, however, this correlation is significant, then the inference is that some unobserved variable influences both decisions. The existence of the sample selection bias is, therefore, established and the estimates of the labour supply have to be corrected.

Heckman [1979] provided a two-step method that can potentially correct for sample selection bias. This requires the estimation of the so-called inverse mills ratio. The Inverse Mills Ratio ($\hat{\lambda}_i$) can be estimated from the parameters of the participation model (equation 11). This involves dividing the probability density function by the cumulative density function:

$$\hat{\lambda}_i = \frac{\phi\,(x_{i2}\beta')}{\Phi(x_{i2}\beta')} \tag{14}$$

This ratio $\hat{\lambda}_i$ is used as an additional regressor in the second stage labour supply model. If a simple t-test suggests that the $\hat{\lambda}_i$ coefficient is not significantly different from zero, then sample selection bias is not a problem and the OLS model can be regarded as consistent. If the simple t-test suggests that the $\hat{\lambda}_i$ coefficient is significantly different from zero, we can then imply that sample selection bias is present, i.e. the farm operators engaging in off-farm employment have certain unobserved characteristics which differ on average in value from those farm operators not engaging in off-farm employment. In the neo-classical model, these differences are absorbed through the reservation wage variable *Wr*. In the next stage of the analysis, we apply the Multinomial Logit Model to analyse the determinants of off-farm work strategies among married couples. In the Multinomial Logit Model, the dependent variable is defined according to the four alternative off-farm work strategies (S) emerging from this model; only the farm operator works off-farm, only the spouse works off-farm, both work off-farm and neither spouse works off-farm.

The Multinomial Logit Model is described as follows:

$$\hat{P}_{jq} = \text{Prob}(Y_i = q) = \frac{\exp(\beta'_q x_j)}{\sum_{k=1}^{4} \exp(\beta'_k x_j)}, \; q = (1,2,3,4) \quad (15)$$

where: β'_q refers to a vector of coefficients corresponding to each strategy q.

A set of probabilities are established for a farm household *j* with a vector of characteristics $x_j = (x_{1j,} x_{2j,} x_{3j,})$. Only *S-1* of the probabilities can be determined independently. This issue arises because the probabilities sum to one and only *S* parameter vectors are needed to determine the *S+1* probablities. This problem is solved by normalizing β'_q to equal zero.

The probabilities can be described as follows:

$$\hat{P}_{jq} = \text{Prob}(Y_i = q | x_j) = \frac{\exp(\beta'_q x_j)}{1+\sum_{k=1}^{S} \exp(\beta'_k x_j)}, \; q = (2,3,4), \beta_0 = 0 \quad (16)$$

In our model results, we express the coefficients relative to the strategy where neither the farm operator or the spouse engage in off-farm employment.

9.4. Data

In this section, we describe the data sources used for the analysis. The analysis is based on the Teagasc National Farm Survey, which is essentially the Irish FADN database but containing richer data on off-farm labour supply. O'Brien and Hennessy [2006] described the objectives of the Teagasc National Farm Survey (NFS) as being to:

- Determine the financial situation on Irish farms by measuring the level of gross output, costs, income, investment and indebtedness across the spectrum of farming systems and sizes;
- Provide data on Irish farm incomes to the EU Commission in Brussels (FADN);
- Measure the current levels of, and variation in, farm performance for use as standards for farm management purposes; and
- Provide a database for economic and rural development research and policy analysis.

To achieve these objectives, a farm accounts book is recorded for each year on a random sample of farms, selected by the CSO, throughout the country. The Teagasc NFS is designed to collect and analyse information relating to farming activities as its primary objective. The Teagasc NFS represents panel data of the form x_{it}, where x_{it} is a vector of observations for farmer *i* in year *t*. As pointed out by O'Brien and Hennessy [2006], the panel is unbalanced in the sense that there is some attrition from year to year as farmers leave the sample and are replaced by other farms. The attrition rate is relatively low, however, and a sizeable proportion of the farms are contained in the dataset for all of the years concerned. New farmers are introduced during the period to maintain a representative sample and the sample size is usually kept to between 1000 and 1100 farms.

Table 1. Mean value statistics for panel data 2005-2014

Variables	Farm operator model	Married couples model
Dependent Variables		
Off-farm job farm operator (0,1)	0.35	0.37
Off-farm hours per annum	515.13	565.88
Both off-farm job	N/A	0.22
Operator only with off-farm job	N/A	0.15
Spouse only with off-farm job	N/A	0.26
Neither with off-farm job	N/A	0.37
Independent variables		
Operator AGE	55.57	55.56
Operator age squared	3238.76	3211.41
Sex (male = 0, female = 1)	0.04	0.02
Specialist dairy (0,1)	0.16	0.19
UAA (ha)	39.90	42.03
Married (0,1)	0.69	1.00
Number of young in HH	0.55	0.76
Household SIZE	3.09	3.65
Hired workers (0,1)	0.19	0.21
Number of livestock units per UAA	1.33	1.36
Decoupled payment (10,000s)	1.43	1.53
Coupled Income (10,000s)	0.62	0.79
Regional variables		
Mid-East region (0,1)	0.10	0.11
Border region (0,1)	0.20	0.18
Midlands region (0,1)	0.11	0.10
Mid-West region (0,1)	0.09	0.09
South-East region (0,1)	0.15	0.15
South-West region (0,1)	0.18	0.18
West region (0,1)	0.18	0.19
Border Midlands West region (0,1)	0.48	0.47

In Table 1, we include summary statistics showing the mean value for the independent variables, which we included in our models. These summary statistics are provided for the whole sample, i.e. for the model of off-farm labour supply among all farm operators. The summary statistics are also provided for the subset of farm households, which are headed by a married couple. The statistics show that 35% of farm operators are engaged in off-farm employment. This rises to 37% among the subset of farms headed by a married couple. The average age of the farm operator is approximately 55 years old. The proportion of farms classified as specialist dairy is approximately 16% for the sample as a whole, but rises to 19% among the farms, which are headed by a married couple. For most variables, the summary statistics for the group of farms headed by a married couple differ little from that for the overall sample. Couple income is, however, noticeably higher for the farms headed by a married couple relative to that for the sample as a whole. This coupled income represents farm income from market activities plus coupled income supports.

9.5. Results – farm operator

In this section, we present results for the off-farm labour supply models of the farm operator. In Table 2A, we provide the results for the participation decision. These results include the coupled farm income variable. The results show that specialist dairy farms and large farms have a reduced probability of engaging in off-farm employment. As expected, we find that coupled farm income is negatively associated with off-farm employment participation. The number of livestock units per hectare is negatively associated with participation. Farm operators with intensive non-dairy herds are, therefore, less likely to participate in off-farm employment relative to their less intensive counterparts. In terms of the household variables, it appears that the number of children is negatively associated with off-farm employment. This suggests that childcare reduces the amount of time available for off-farm work.

In Table 2B, we provide results for the participation model with a variable representing the value of the decoupled payments. Focusing on the decoupled payment variable, it is clear that the decoupled payments are negatively associated with off-farm employment participation. This implies that the wealth effect of decoupled payments has dominated the relative wage effect. Farms with relatively high payments are, therefore, likely to participate less in off-farm employment. The relative strength of the wealth effect appears stronger in this research relative to the findings of previous research, which compared the determinants of off-farm employment in Ireland and Italy around the time of the introduction of decoupled payments [Loughrey et al., 2013].

Table 2A. Results for off-farm employment of the operator probit analysis

Variables			
Age	0.118*** (0.03)	0.110*** (0.03)	0.110*** (0.03)
Age squared	-0.00222*** (0.00)	-0.00204*** (0.00)	-0.00198*** (0.00)
Sex (male = 0, female = 1)	0.210 (0.29)	0.148 (0.29)	0.150 (0.28)
Specialist dairy (0,1)	-1.592*** (0.20)	-1.919*** (0.20)	-1.696*** (0.18)
UAA (ha)	-0.0233*** (0.00)	-0.0182*** (0.00)	
Spouse working off-farm (0,1)	-0.233** (0.11)	-0.235** (0.11)	-0.224** (0.11)
Coupled farm income (10,000s)	-0.0627*** (0.02)	-0.0864*** (0.02)	-0.108*** (0.02)
Married (0,1)	0.443** (0.18)	0.386** (0.17)	0.275 (0.17)
Number of young in HH	-0.166** (0.07)	-0.163** (0.07)	-0.188*** (0.07)
Household size	0.178*** (0.05)	0.170*** (0.05)	0.165*** (0.05)
Hired workers (0,1)	-0.178 (0.11)	-0.241** (0.11)	-0.272** (0.11)
Number of livestock units per UAA	-1.109*** (0.14)		
Mid-East region (0,1)	Excl.	Excl.	Excl.
Border region (0,1)	0.466 (0.34)	0.702** (0.34)	0.918*** (0.33)
Midlands region (0,1)	1.024** (0.40)	0.987** (0.40)	1.009*** (0.39)
Mid-West region (0,1)	0.480 (0.40)	0.730* (0.39)	1.000** (0.39)
South-East region (0,1)	0.0218 (0.34)	-0.0273 (0.33)	0.135 (0.33)
South-West region (0,1)	0.113 (0.33)	0.250 (0.32)	0.446 (0.32)
West region (0,1)	1.613*** (0.47)	1.779*** (0.44)	2.362*** (0.36)
2005	Excl.	Excl.	Excl.
2006	0.0449 (0.13)	0.0681 (0.13)	0.0258 (0.13)
2007	0.104 (0.13)	0.179 (0.13)	0.135 (0.13)
2008	0.325** (0.13)	0.393*** (0.13)	0.324** (0.13)
2009	-0.0955 (0.14)	-0.00466 (0.14)	-0.0827 (0.14)
2010	-0.351** (0.14)	-0.217 (0.14)	-0.287** (0.14)
2011	-0.274* (0.14)	-0.101 (0.14)	-0.170 (0.14)
2012	-0.230 (0.16)	-0.161 (0.16)	-0.268* (0.16)
2013	-0.0350 (0.17)	0.000594 (0.16)	-0.112 (0.16)
2014	0.0468 (0.17)	0.0805 (0.17)	-0.0508 (0.16)
Constant	-0.653 (0.84)	-2.641*** (0.79)	-4.310*** (0.76)
N	10581	10581	10581

Table 2B. Results for off-farm employment probit analysis

Variables			
Age	0.118*** (0.03)	0.113*** (0.03)	0.116*** (0.03)
Age squared	-0.00224*** (0.00)	-0.00211*** (0.00)	-0.00213*** (0.00)
Sex (male = 0, female = 1)	0.191 (0.29)	0.123 (0.29)	0.129 (0.28)
Specialist dairy (0,1)	-1.743*** (0.19)	-2.154*** (0.19)	-2.143*** (0.19)
UAA (ha)	-0.0172*** (0.00)	-0.0106*** (0.00)	
Spouse working off-farm (0,1)	-0.226** (0.11)	-0.222** (0.11)	-0.210* (0.11)
Decoupled payment (10,000s)	-0.349*** (0.08)	-0.485*** (0.08)	-0.673*** (0.07)
Married (0,1)	0.431** (0.17)	0.391** (0.17)	0.360** (0.17)
Number of young in HH	-0.177*** (0.07)	-0.175*** (0.07)	-0.187*** (0.07)
Household size	0.185*** (0.05)	0.180*** (0.05)	0.181*** (0.05)
Hired workers (0,1)	-0.132 (0.11)	-0.184* (0.11)	-0.188* (0.11)
Number of livestock units per UAA	-1.047*** (0.13)		
Border region (0,1)	0.424 (0.33)	0.623* (0.33)	0.660** (0.33)
Midlands region (0,1)	1.063*** (0.38)	1.087*** (0.39)	1.139*** (0.38)
Mid-West region (0,1)	0.371 (0.38)	0.549 (0.38)	0.581 (0.38)
South-East region (0,1)	0.0471 (0.33)	0.0200 (0.33)	0.103 (0.33)
South-West region (0,1)	0.0124 (0.32)	0.0950 (0.32)	0.108 (0.32)
West region (0,1)	1.439*** (0.38)	1.583*** (0.39)	1.678*** (0.37)
2006	0.137 (0.13)	0.197 (0.13)	0.211* (0.13)
2007	0.170 (0.13)	0.269** (0.13)	0.277** (0.13)
2008	0.433*** (0.13)	0.542*** (0.13)	0.549*** (0.13)
2009	0.0553 (0.14)	0.204 (0.14)	0.213 (0.13)
2010	-0.276* (0.14)	-0.111 (0.14)	-0.110 (0.14)
2011	-0.246* (0.14)	-0.0634 (0.14)	-0.0708 (0.14)
2012	-0.182 (0.16)	-0.0785 (0.16)	-0.0917 (0.16)
2013	0.00219 (0.16)	0.0674 (0.16)	0.0448 (0.16)
2014	0.0494 (0.17)	0.103 (0.16)	0.0647 (0.16)
Constant	-0.541 (0.81)	-2.114*** (0.78)	-2.449*** (0.76)
N	10581	10581	10581

In Table 3, we present the results for the intensive margin, i.e. the hours of off-farm employment model. As in the case of the participation model, we find that age has a non-linear relationship with off-farm employment. Many of the independent variables have the same direction of relationship with off-farm employment in both the participation and hours of off-farm employment models. In contrast with the participation model, we find that the off-farm employment status of the spouse is highly significant and negative in its relationship with the extent of the farm operator's off-farm employment. Farm operators with a spouse in off-farm employment may, all other things being equal, be under less pressure to engage in a particularly high number of hours of off-farm labour.

Being married is positively associated with the extent of off-farm employment, while the number of children is negatively associated with the extent of off-farm employment. Focusing finally on the decoupled payments, it appears that the payments are negatively associated with the number of hours in off-farm labour. As in the case of the participation model, this again implies that the wealth effect is dominating the relative wage effect and the decoupled payments relax the commitment to off-farm employment. One may argue that this is not an undesirable effect of the payments given the average number of hours committed to off-farm employment as reported in Table 1.

Table 3. Results for hours of off-farm employment analysis

Variables	
Age	0.116*** (0.03)
Age squared	-0.00222*** (0.00)
Sex (male = 0, female = 1)	0.162 (0.29)
Specialist dairy (0,1)	-1.907*** (0.20)
UAA (ha)	-0.0182*** (0.00)
Spouse working off-farm (0,1)	-0.225** (0.11)
Married (0,1)	0.460*** (0.18)
Number of young in HH	-0.169** (0.07)
Household Size	0.182*** (0.05)
Hired workers (0,1)	-0.133 (0.11)
Number of livestock units Per UAA	-1.075*** (0.13)
Decoupled payment (10,000s)	-0.370*** (0.09)
Time dummies	
2006	0.139 (0.13)
2007	0.171 (0.13)
2008	0.430*** (0.13)
2009	0.0556 (0.14)
2010	-0.277** (0.14)
2011	-0.249* (0.14)
2012	-0.181 (0.16)
2013	0.00660 (0.16)
2014	0.0604 (0.17)
Constant	0.217 (0.79)

9.6. Results – farm operator and spouse

In this section, we provide the results for the choice of off-farm work strategy among those farm households, which are headed by married couples. These results are presented below in Table 4.

Table 4. Results for off-farm employment multinomial logit analysis

Variables	Strategy = operator only works off-farm	Strategy = spouse only works off-farm	Strategy = both operator and spouse works off-farm
Age	0.212*** (0.03)	0.209*** (0.03)	0.218*** (0.03)
Age squared	-0.00293*** (0.00)	-0.00284*** (0.00)	-0.00352*** (0.00)
Specialist dairy (0,1)	-1.343*** (0.13)	0.0131 (0.07)	-1.634*** (0.12)
UAA (ha)	-0.0227*** (0.00)	-0.00399*** (0.00)	-0.0138*** (0.00)
Number of livestock units per UAA	-0.647*** (0.08)	-0.0626 (0.06)	-0.715*** (0.08)
Number of young in HH	-0.0346 (0.05)	-0.00781 (0.04)	-0.259*** (0.05)
Household size	0.0379 (0.04)	-0.0630** (0.03)	0.113*** (0.04)
BMW NUTS 2 region (0,1)	0.508*** (0.09)	-0.0700 (0.06)	0.378*** (0.08)
Decoupled PAYMENT (10,000s)	-0.142** (0.06)	-0.0252 (0.03)	-0.348*** (0.05)
2005	Excl.	Excl.	Excl.
2006	0.0529 (0.17)	0.147 (0.13)	0.294* (0.17)
2007	0.123 (0.17)	0.300** (0.13)	0.392** (0.17)
2008	0.131 (0.17)	0.233* (0.13)	0.717*** (0.17)
2009	-0.101 (0.18)	0.182 (0.13)	0.399** (0.17)
2010	-0.266 (0.18)	0.129 (0.13)	0.0525 (0.17)
2011	-0.344* (0.18)	0.0278 (0.13)	-0.0530 (0.17)
2012	-0.0553 (0.19)	0.272** (0.13)	0.269 (0.18)
2013	0.126 (0.19)	0.470*** (0.14)	0.572*** (0.18)
2014	0.135 (0.20)	0.505*** (0.14)	0.618*** (0.19)
_cons	-1.366 (0.91)	-2.256*** (0.68)	-0.0393 (0.70)

**Results are relative to strategy of neither operator or spouse in off-farm employment.

For the main variable of interest, we find that decoupled payments are significantly negatively associated with the likelihood of both the farm operator and the spouse engaging in off-farm employment. This corresponds to our initial hypothesis. The results show, however, that the decoupled payments have no significant relationship with the likelihood of a strategy whereby only the spouse works off-farm. We also find that the presence of a specialist dairy farm and the degree of livestock intensity (livestock units per hectare) have no significant relationship with the choice of this strategy. The result for decoupled payments suggests that these payments have a very limited impact on the decision-making of the farm spouses with regard to off-farm employment and this corresponds with previous findings by El-Osta et al. [2008] for the United States. This result may be related to the high education levels of many farm spouses and their ability to gain employment off-farm. As in the case of Nordin et al. [2018], we may not presume that farm income or the overall household income is shared equally between the farm operator and the spouse and an unequal sharing of income may also be a contributory factor. We find that living in the NUTS 2 Border, Midlands and West region is positively associated with the strategy whereby both the operator and the spouse engage in off-farm employment. This reflects the disadvantaged economic conditions of farming in much of this region.

9.7. Summary and conclusions

We investigate the determinants of off-farm labour participation among farm household members in Ireland with the primary aim of understanding the role played by decoupled payments. To this end, a neoclassical household model is used to model farm households' labour allocation decisions. Under this framework, the effect of decoupling on off-farm participation is the result of two contrasting effects namely a wage effect, that should increase the off-farm labour participation, and a wealth effect, that should reduce it. Thus, which of the two effects will prevail is an empirical question. Overall, many of the considered determinants of off-farm labour participation and off-farm labour supply have the expected significant effect. Among farm operators, the results suggest that decoupled payments have a negative effect on the off-farm participation decision and on number of off-farm employment hours. This implies that the wealth effect of decoupled payments is the dominant factor in influencing off-farm employment decisions.

For married couples, the analysis finds a negative relationship between decoupled payments and the probability of both the farm operator and the spouse working in off-farm employment. Interestingly, decoupled payments have no significant relationship with the probability of the spouse only working in off-farm employment. This result corresponds to the finding of El-Osta et al. [2008] and suggests that decoupled payments tend to play a very limited role in explaining the off-farm employment decisions of the spouse. Future research should seek to develop a better understanding about the off-farm employment opportunities for both farm operators and their spouses and the degree to which farm household members contribute in terms of both farm and off-farm employment.

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