The Common Agricultural Policy and Farmers' Off-farm Labour Supply

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Abstract:

This paper uses farm-level data from Ireland to explore the impact of agricultural policies on the farm operators' off-farm labour allocation decisions. The hypothesis that decoupled direct payments induce farmers to allocate more time to off-farm employment is tested. Despite earlier studies based Irish data finding evidence to support this hypothesis, 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. The potential relationship between farm income variability and off-farm employment decisions in the short and medium term for the case of Irish farm operators is also explored. The analysis identifies a positive association between farm income variability and off-farm employment in the medium term but no significant relationship in the short-term. This suggests that off-farm employment is part of a wider portfolio decision and the recent increases in farm income variability due to reforms of the Common Agricultural Policy, has induced farmers to work more off farm.

Key words: Off-farm labour supply, direct payments, farm income variability, probit model.

1. Introduction

Off-farm employment by farmer operators 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, poor and volatile farm incomes and declining agricultural commodity prices (in real terms) have contributed as push factors. Growing rural labour markets with higher and more stable wage rates are among the main pull factors. The factors affecting off-farm employment trends are explored in this paper as are the implications for rural labour markets.

This paper examines the impact of the Common Agricultural Policy's (CAP) direct payment scheme, agricultural market conditions and macroeconomic developments on farmers' labour allocation decisions in Ireland. In particular, we focus on the impact of decoupling and recent agricultural market price volatility on farmers' off-farm labour decisions. The case of Ireland provides an interesting setting for this analysis. Along with Spain and Greece, Ireland experienced the largest declines in the employment rate among 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. In this paper we first hypothesize that the decoupling of direct payments led to an increase in off-farm labour activity. Second, we examine the impact of farm income variability on farmers' off-farm labour decisions. The hypothesis is that the recent growth in price volatility, and by consequence farm income risk, induces farmers to seek less risky income sources off-farm as part of a wider portfolio strategy. 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.

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.

In this paper, we deal specifically with the labour allocation decisions of the farm operator and so a reduced form of the agricultural household model is used that only represents the decisions of the farm operator. This leads to a simpler model as it excludes among other things the possible interdependence between the farm operator and the spouse in the decision-making process. The Utility function, U is assumed to be a function of consumption C and leisure time L as expressed by equation 1.

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

subject to

$$T = L + O + F \qquad O \geq 0 \tag{2}$$

$$C P_c = w O + (P_f Y_f - I_f X_f) + V \tag{3}$$

$$W = W(H,Z) \tag{4}$$

Equation 2 shows that the utility function is maximised subject to time constraints as the farmer's total time endowment T is finite and is allocated between leisure (L), off-farm work (O) and farm work (F). 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 2.

Equation 3 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, wO, 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 multiplied by the off-farm hours O while the farm profit amounts to the price of farm goods produced Pf by the volume of production Yf less the cost of production, i.e. the cost of farm inputs If by the volume of output Yf.

The farm operator faces an off-farm wage rate W that is a function of H the farmer's human capital and Z the local labour market conditions. The trade off between time spent farming and time spent off the farm is conceptualised diagrammatically by Sumner (1982) and is recreated in Donnellan and Hennessy (2012).

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. This can be expressed as follows,

$$E[I_i|X] = P(O_i = 1) = P(w^r < w^i) = \beta' X \quad (5)$$

where P(Oi = 1) is the probability of Oi = 1, that is participating in off-farm employment, which occurs if wr<wi, that is the reservation wage rate is less than the wage offered off-farm. 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 (Huffman. 1988).

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 6.

$$O = T - L - F = f(w^i, P_f, I_f, V, H, Z) \quad (6)$$

The number of hours supplied to off-farm work O is a function of the off-farm wage wi, farm profit, i.e. output less costs (P_f - I_f), exogenous household income V, the farm operator's human capital H and local employment market conditions Z.

Our interest is in the impact of CAP payments on the labour allocation decision and in particular the impact of the decoupling of such payments in 2005. Prior to the introduction of decoupling,

European farmers benefitted from coupled payments which effectively increased the value of farm output and in turn the return to farm labour. After the 2005 reform of the Common Agricultural Policy, farmers received support independent of their production decisions as long as they complied with the "Statutory Management Requirements" and maintained their land in "Good Agricultural and Environmental Condition". The new policy environment thereby changed the incentives for farmers towards off-farm employment. In effect this reduced the coupled profitability of output and as such reduced the return to farm labour. Other things being equal one would expect the farmer to substitute off-farm labour for farm labour as the relative wage rates have changed.

However, in this framework, the substitution effect must compete against the wealth effect in order to determine whether or not off-farm labour supply responded significantly to the new policy regime. The introduction of the decoupled payment represents a non-labour income and as such may induce the farmer to work less and maintain consumption, i.e. the wealth effect. Previous empirical work by Hennessy and Rehman (2008) found evidence to support this theoretical model in the case of Irish farmers prior to the introduction of the reforms. In the US, Ahearn et al. (2006) analysed ex-post the effect of the FAIR Act (Federal Agriculture Improvement and Reform) Act of 1996, known informally as the Freedom to Farm Act or the 1996 US Farm Bill. This introduced production flexibility contract (PFC) payments to be somewhat decoupled payments from production (Lin et. al. 2000). Ahearn et al. (2006) found that the introduction of decoupled payments increased off-farm labour supply among those already engaged in off-farm work but that neither coupled nor decoupled payments were found to be significant drivers in the decision to participate in off-farm employment.

A secondary objective of this analysis is to identify the possible relationship between farm income variability and off-farm employment among Irish farm operators during the last decade, a period of high macroeconomic volatility (Bermingham and Conefrey 2014; Maravalle and Claeys 2012). Mishra and Goodwin (1997) identified the intuitive result that higher farm income variability significantly induced more off-farm labour supply among a sample of Kansas farmers indicating the strength of a portfolio motive whereby off-farm employment represents a deliberate risk management strategy.

The short-term variability of gross farm income is estimated using two alternatives. The first of these two alternative measures of short-term volatility is the percentage change in total gross farm income and is therefore employed as a measure of short-term income volatility in Equation 7.

$$\Delta Y = ((Y_t - Y_{t-1})/Y_{t-1}) * 100 \quad (7)$$

The second measure of short-term income volatility is more complex and only applies to the coupled gross farm incomes. We carry out a detrending exercise on the 'coupled gross farm income' variable. This is important in estimating short-term variability of farm incomes. In the absence of detrending, it is likely that income variability will be over-estimated on many farms and could potentially bias the results. Finger and El Benni (2014) explain, for example, that the identification of income trends should be considered in constructing an alternative specification for reference incomes under the EU income stabilization tool. The detrending methodology is explained in more detail in Loughrey and Hennessy (2016). Ultimately, this second measure of short-term income variability is based on deviations of coupled gross farm income from the expected farm income in any given year.

The medium term variability in gross farm income is estimated based on the standard deviation of total gross farm income σ_k and the coefficient of variation CV of both total and coupled gross farm income over the first nine years of the decoupled era (i.e. 2005-2013).

3. Methodology and Data

In this section, we describe the econometric methodology used to model the off-farm labour supply of farm operators in Ireland. Our primary objective is to identify the extent to which different factors contribute towards the hours of off-farm labour supply for farm operators in both countries. We wish to estimate the hours equation in the following:

$$OHRS_{it}^{*} = \beta_0 + \beta'_1 X_{1it}^{*} + \varepsilon_{1it} \quad (7)$$

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 v_{1it} 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

$$\varepsilon_{1it} = v_{1it} + u_{1it}. \tag{8}$$

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:

$$w_{it}^{r*} = \beta_0 + \beta' X_{it}^{*} + \varepsilon_{it} \tag{9}$$

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

$$O_{it} \begin{cases} 1 \; if \; (w_{it}^{r*} > 0) \\ 0 \; if \; (w_{it}^{r*} < 0) \end{cases} \tag{10}$$

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 modelling the participation decision.

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

$$O_{it}^{*} = \exp(\beta_0 + \beta'_{2} X_{2i}^{*}) + \varepsilon_{2it} \tag{11}$$

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.

$$\varepsilon_{2it} = v_{2it} + u_{2it} \tag{12}$$

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:

$$\hat{\lambda}_i = \frac{\phi(x_{i2}\beta')}{\Phi(x_{i2}\beta')} \tag{13}$$

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 W^r.

Data

In this section, we describe the data sources used for the analysis. The Irish Analysis utilises 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 National Farm Survey (NFS) as being to

1. 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,
2. Provide data on Irish farm incomes to the EU Commission in Brussels (FADN),
3. Measure the current levels of, and variation in, farm performance for use as standards for farm management purposes, and
4. 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 National Farm Survey is designed to collect and analyse information relating to farming activities as its primary objective. Information and data relating to other activities by the household are considered secondary and as such where this information is presented it should be interpreted with caution.

The Teagasc NFS represents panel data of the form *xit*, where *xit* 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	
Dependent Variables	
Off Farm Job (0,1)	0.35
Off Farm Hours Per Annum	515.13
Independent Variables	
Age	55.57
Age Squared	3238.76
Sex (Male = 0, Female = 1)	0.04
Specialist Dairy (0,1)	0.16
UAA (ha)	39.90
Married (0,1)	0.69
Number of young in HH	0.55
Household Size	3.09
Hired Workers (0,1)	0.19
Number of Livestock Units Per UAA	1.33
Decoupled Payment (10,000s)	1.43
Decoupled Payment (0-0.5)	0.17
Decoupled Payment (0.5-1.0)	0.30
Decoupled Payment (1.0-1.5)	0.20
Decoupled Payment (1.5-2.0)	0.12
Decoupled Payment (2.0-2.5)	0.08
Decoupled Payment (2.5+)	0.13

In table 2, we provide statistics in relation to the historical income variability in different farm systems. As in the case of Mishra and Goodwin (1997), the coefficient of variation of gross farm income is the measure of income variability. One can see from table 2 that the median coefficient of variation for the Gross Farm Income is close to 22 per cent for the period from 2005-2013. The Variability of Gross Income appears highest for cattle farmers at approximately 24 per cent and lowest for sheep farmers at 19 per cent. The median among specialist dairy farms is approximately 21 per cent. The coefficient of variation is much greater when direct payments are excluded. For instance, the median coefficient of variation is approximately 37 per cent for the sheep system with the exclusion of direct payments. This shows that the ranking of systems is quite sensitive to the definition of income and also shows that the direct payments play an important role

Table 2: Median Coefficient of Variation for Different Farm Systems 2005-2013

Farm System	Gross Farm Income	Coupled Gross Farm Income
Cattle	24.42	52.35
Specialist Dairy	21.08	26.23
Tillage	18.50	32.70
Sheep	19.43	37.11
Dairy and Other	20.52	32.75
Total	22.12	39.19
Mean Sample Size Per Year	849	849

Source: Authors calculations using Teagasc National Farm Survey data

4. Results

In this section, we present results for the off-farm labour supply models. These results include those for the participation probit model and the hours of labour supply model. In the final part of this section, we include the results from the farm income variability and off-farm employment participation probit model.

In table 3A, we provide the first set of results for the participation decision. It appears from these results that age has a non-linear relationship with the participation in off-farm employment with an initial positive relationship peaking at approximately 50 years old. Based on these findings, it appears that the probability of off-farm employment participation declines in subsequent years. Specialist dairy farms and large farms have a reduced probability of engaging in off-farm employment. 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. We find that decoupled payments are negatively associated with off-farm employment. 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 3A: Results for Off-Farm Employment Probit Analysis

Variables	
Age	0.335*** (0.12)
Age Squared	-0.00674*** (0.00)
Specialist Dairy (0,1)	-5.207*** (1.88)
UAA (ha)	-0.0504*** (0.02)
Spouse working off-farm (0,1)	-0.378 (0.28)
Married (0,1)	0.192 (0.62)
Number of young in HH	-0.508*** (0.19)
Household Size	0.314* (0.18)
Hired Workers (0,1)	-0.149 (0.23)
Number of Livestock Units Per UAA	-2.517*** (0.95)
Decoupled Payment (10,000s)	-0.752* (0.43)
Mills Ratio	2.517** (1.03)
2006	0.309 (0.24)
2007	0.482* (0.27)
2008	1.070** (0.45)
2009	-0.120 (0.26)
2010	-1.002*** (0.33)
2011	-1.377*** (0.33)
2012	-0.684* (0.37)
2013	-0.215 (0.38)
2014	0.204 (0.41)
Constant	15.29*** (1.45)

In table 3B, we deliver results for the participation model with binary variables to represent the size of the decoupled payments. Focusing on the binary decoupled payment variables, it is clear that the decoupled payments are negatively associated with off-farm employment participation at relatively low levels of payment. In particular, we find that farm operators with payments in excess of €5,000 are less likely to engage in off-farm employment relative to farm operators with lower entitlements. It appears that there may be a non-linear relationship between the value of the decoupled payments and the off-farm employment participation decision. It is clear that the size of the coefficients is much greater for the two categories representing the highest decoupled payment recipients relative to other categories.

Table 3B: Results for Off-Farm Employment Probit Analysis

Variables	
Age	0.124*** (0.03)
Age Squared	-0.00238*** (0.00)
Sex (Male = 0, Female = 1)	0.202 (0.30)
Specialist Dairy (0,1)	-2.008*** (0.24)
UAA (ha)	-0.00337 (0.00)
Spouse working off-farm (0,1)	-0.215* (0.12)
Married (0,1)	0.518*** (0.19)
Number of young in HH	-0.157** (0.07)
Household Size	0.208*** (0.05)
Hired Workers (0,1)	-0.0857 (0.11)
Number of Livestock Units Per UAA	-0.0184*** (0.00)
Binary Decoupled Payment Variables	
Decoupled Payment 10,000s (0.5-1.0)	-1.063** (0.54)
Decoupled Payment 10,000s (1.0-1.5)	-1.989*** (0.51)
Decoupled Payment 10,000s (1.5-2.0)	-1.925*** (0.53)
Decoupled Payment 10,000s (2.0-2.5)	-3.183*** (0.56)
Decoupled Payment 10,000s (2.5+)	-2.963*** (0.57)
Time Dummies	
2006	0.114 (0.13)
2007	0.153 (0.13)
2008	0.443*** (0.13)
2009	0.111 (0.14)
2010	-0.211 (0.14)
2011	-0.178 (0.14)
2012	-0.0778 (0.17)
2013	0.123 (0.17)
2014	0.185 (0.18)
Constant	0.364 (0.83)

In table 4, 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, also peaking at approximately 50 years old and declining thereafter. 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 employment.

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 4: 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)

In table 5, we present some results from the farm income variability and off-farm employment participation model. A more comprehensive set of results and discussion is available from (Loughrey and Hennessy 2016). These results show that the variables representing medium-term income variability tend to have a positive relationship with off-farm employment. The results indicate that off-farm employment is part of a wider portfolio strategy and is not just a means of raising the absolute household income. This conforms to the previous findings of Mishra and Goodwin (1997) which identified a positive relationship between historical farm income variability and off-farm employment for a sample of Kansas farmers.

To some extent, the off-farm employment may act as a substitute for the direct payments in stabilising the variability of household income where the direct payments are particularly low. Indeed, a recent paper by Chambers and Voica (2016) found that in the presence of off-farm investment and employment, 'the production decisions become decoupled from lump-sum subsidies in the presence of risk and uncertainty'. We find no significant relationship between short-term farm income and off-farm employment. This is not a particularly surprising result given the average time commitment to off-farm employment by those farmers who work off-farm. Many Irish farmers are unlikely to enter off-farm employment as an immediate response to one difficult farm income year and it may require a longer period of farm income volatility or a succession of years with low farm income to bring about a decision to enter off-farm employment.

An additional part of this model is that we account for a recent loss of off-farm employment during the recession. We find that recessionary job loss has a significant negative effect on the probability of off-farm employment. The marginal effects suggest that the effect is approximately 12 per cent although this is dependent on the value of the other independent variables. In terms of the remaining results, there are broad similarities with the findings in table 3a-table 3. We find that the expected gross farm income[1] has a significant negative relationship with the engagement in off-farm employment. In this model, we have included a dummy variable to represent those farms specialising mainly in tillage production. These farms experience particularly high farm income variability due to the volatility in output and input prices and the volatility in crop yields (Loughrey et al., 2016)

[1] Gross farm income is farm income excluding the farm overheads which are not allocated to one particular farm system. This applies to items such as interest repayments, depreciation, maintenance and repairs.

Table 4: Off-Farm Labour Supply Panel Probit Model in Decoupled Era (2005-2013)

	(1)	(2)	(3)
Medium-Term Income Variability [Columns 1-2]			
Standard Deviation of Gross Farm Income (10,000s)	0.567*** (0.15)		
Detrended Standard Deviation of Coupled Gross Farm Income (10,000s)		0.441*** (0.16)	
Short-Term Income Variability [Column 3]			
One Year Percentage Change in Income			-0.00172 (0.00)
Other Variables			
Off-Farm Job Spouse (0,1)	-0.240 (0.15)	-0.161 (0.15)	-0.206 (0.16)
Recessionary Job Loss (0,1)	-2.622*** (0.27)	-2.603*** (0.26)	-2.323*** (0.29)
Livestock Units Per HA	-0.954*** (0.17)	-0.950*** (0.17)	-1.267*** (0.18)
Age	0.338*** (0.05)	0.323*** (0.05)	0.267*** (0.05)
Age Squared	-0.00446*** (0.00)	-0.00436*** (0.00)	-0.00369*** (0.00)
Gender (Male =0, Female=1)	0.316 (0.42)	0.173 (0.40)	0.0635 (0.48)
Specialist Dairy (0,1)	-0.809*** (0.25)	-0.879*** (0.24)	-1.453*** (0.25)
Mainly Tillage (0,1)	-0.342 (0.34)	-0.299 (0.35)	-0.555 (0.37)
Number of Hectares	-0.0197*** (0.00)	-0.0187*** (0.00)	-0.0258*** (0.00)
Hired Labour (0,1)	-0.0496 (0.13)	-0.0611 (0.13)	-0.148 (0.14)
Married (0,1)	0.552** (0.25)	0.680*** (0.24)	0.549** (0.26)
Number of Children 0-15 years old	-0.202** (0.09)	-0.198** (0.09)	-0.239** (0.09)
Number of Household Members	0.161** (0.06)	0.163*** (0.06)	0.169*** (0.07)
Average Gross Farm Income (10,000s)	-0.495*** (0.06)		
Predicted or Trend Coupled Gross Farm Income (10,000s)		-0.409*** (0.06)	
Constant	-5.408*** (1.34)	-5.088*** (1.35)	-3.578*** (1.26)

Level of Significance: *p<0.10, **p<0.05, ***p<0.01

5. Conclusions

This paper investigated the determinants of off-farm labour participation in Ireland with the aims of understanding the role played by decoupled payments and farm inocme variability. To this end, a neoclassical household model based on utility maximisation 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, overall, which of the two effects will prevail is an empirical question that we addressed through an hours off-farm labour supply equation, and an off-farm participation equation, to take care of the possible unobserved selection effects. Overall, many of the considered determinants of off-farm labour participation and off-farm labour supply have the expected significant effect. The results suggest that decoupled payments have a negative effect on the off-farm participation decision and on the hours supply.

The paper also explored whether or not off-farm employment has been used as a coping strategy in response to increasingly volatile incomes in Ireland during the decoupled era from 2005-2013. While the analysis is confined to the case of Ireland, there are some useful insights that can be of relevance to the situation in other EU member states where a shortage of appropriate financial risk management tools is limiting the ability of farmers to deal with income risk. The results show that farm income variability appears to have some relationship with off-farm employment decisions over the medium-term but not in the short-term. This suggests that 'the portfolio motive' for the engagement in off-farm employment does exist but that off-farm employment is not viewed as an efficient short-term response to high farm income volatility. The absence of a significant short-term response in off-farm labour supply does not necessarily mean that adverse income shocks have no eventual impact on labour supply. Farmers may in some cases take 'a wait and see approach' and take some time before deciding to enter off-farm employment in response to bad income years.

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