Comparative Analysis of Factor Markets for Agriculture across the Member States

245123-FP7-KBBE-2009-3

WORKING PAPER

No. 60, August 2013

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Determinants of Farm Labour Use
A Comparison between Ireland and Italy

ABSTRACT

This paper examines the effect of the decoupling of farm direct payments upon the off-farm labour supply decisions of farmers in both Ireland and Italy. We use panel data from the Farm Business Survey (REA) and FADN database covering the period from 2002 to 2009 to model these decisions. Drawing from the conceptual agricultural household model, we hypothesise that the decoupling of direct payments led to an increase in off-farm labour activity despite some competing factors. This hypothesis rests largely upon the argument that the effects of changes in relative wages have dominated other factors. At a micro level, the decoupling-induced decline in the farm wage relative to the non-farm wage ought to have provoked a greater incentive for off-farm labour supply. The main known competing argument is that decoupling introduced a new source of non-labour income i.e. a wealth effect. This may in turn have suppressed or eliminated the likelihood of increased off-farm labour supply for some farmers. For the purposes of comparative analysis, the Italian model utilises the data from the REA database instead of the FADN as the latter has a less than satisfactory coverage of labour issues. Both models are developed at a national level. We draw from the literature on female labour supply and use a sample selection corrected ordinary least squares model to examine both the decisions of off-farm work participation and the decisions regarding the amount of time spent working off-farm. The preliminary results indicate that decoupling has not had a significant impact on off-farm labour supply in the case of Ireland but there appears to be a significantly negative relationship in the Italian case. It still remains the case in both countries that the wealth of the farmer is negatively correlated with the likelihood of off-farm employment.

Keywords: Labour Supply, Off Farm Employment, Farm Holder, Italy, Ireland

J.E.L. Classification: J22, J43, Q12

Available for free downloading from the Factor Markets (www.factormarkets.eu) and CEPS (www.ceps.eu) websites

ISBN 978-94-6138-341-9

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1. Introduction

In both Ireland and Italy, the participation in off-farm employment is a necessity for many farm households given the small-scale nature of their farming operations. For example, the smallest one-quarter of farms in Ireland account for just about 3% of all gross agricultural output and for about 10% of all gross agricultural output in the case of Italy (Moreddu, 2011). Many farm households cannot therefore rely upon farming as their only income source. In addition, the entry into off-farm employment can be driven by other push and pull factors. In this paper, we model the decision to enter off-farm employment and the number of off-farm labour hours for farm holders in both countries. We place particular emphasis on the possible role of the decoupling of direct payments in 2005, given that this radical reform altered the incentives for farm holders towards off-farm employment in both countries.

Prior to the introduction of decoupling, farmers in Ireland and Italy benefited from price supports, which motivated them to increase production levels and therefore commit longer working hours to farm labour than would otherwise have been the case. In addition to the well recognised trade distortion impacts, these policies constrained the amount of time available for off-farm work participation. After the 2005 reform of the Common Agricultural Policy, farmers received support independently 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.

According to neo-classical economic theory, an increase in off-farm employment is not an inevitable outcome of this reform given that the introduction of the decoupled single farm payment provided a new non-labour source of income i.e. a wealth effect. 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. Previous empirical work by Hennessy & 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.

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In the Italian literature, a recent paper by Corsi & Salvioni (2012) examined the impact of the 2005 CAP reform on off-farm labour participation rates among 437 cereal, oilseed and protein crop farmers. This particular study found that working capital has a negative and significant effect on the probability of off-farm work participation of the farm operator. Location factors are found to be important in that farm holders located in the mountains have an 8.4% higher probability of having an off-farm job. The single farm payment is found however not to be a significant driver of participation among this subset of farms. It will be interesting to identify in this paper as to whether or not this result differs for a wider sample of Italian farms from different farm systems. Unlike our paper, the paper by Corsi and Salvioni did not examine the supply of off-farm labour hours.

While large reforms can alter the incentives towards off-farm employment, the literature in this area has over a longer period examined the role of individual, family and other characteristics in the relevant off-farm labour supply decisions. Huffman (1977 and 1980) presented evidence that investment in education and agricultural extension services increases farmers' off-farm labour supply by increasing the reallocative ability of farmers. Other studies have supported the significant influence of local labour market conditions, focusing on the distance from a metropolitan area and the local rate of unemployment among other factors. Sumner (1982) showed that urbanisation positively influences the participation rate because of the increase in off-farm job opportunities. Tokle & Huffman (1991) proved the significant effect of local economic conditions such as the anticipation of labour demand growth, unemployment rates and share of employment in services.

The importance of farm characteristics and farm family structure in the decision to participate in off-farm work has also been the subject of a number of studies. Kilkenny (1993) and Kimihi (1994) present evidence that participation in off-farm labour markets differs across farm type and family structure. Several papers showed that farm system and size, that is type of farm enterprise, affects the labour decision (e.g. Lass et al. 1989). Some studies have established the significance of the number of dependents on the farm income. Mishra & Goodwin (1997) found a negative effect between the number of children and the number of hours worked off farm by farmers' spouses. The effect of children on farmers' time allocation is less clear. Lass et al. (1991) explain that on the one hand childcare may require a husband's time, but on the other hand the presence of more children may generate greater pressure to achieve additional income due to the consumption needs of a larger family.

The risk preferences of the farm operator also come within the wider neo-classical framework. Off-farm employment can potentially provide a more stable form of income than farm income. The risk-averse nature of farmers can therefore manifest itself in greater off-farm employment participation as found by Barlett (1991) and Mishra & Goodwin (1997). Hennessy (1998) found that the introduction of decoupled payments can, however, induce farmers to take riskier production decisions leading to an expansion in farm output and a decline in off-farm employment in response to the decline in farm income risk exposure.

This paper uses an agricultural household modelling framework to consider the substitution and wealth effects of decoupled payments and the implications for farmers' off-farm labour participation and supply decisions. The paper provides an ex-post assessment. This contrasts with the ex-ante analysis of Irish farms by Hennessy & Rehman, which relied upon projections at the macro level. The arrival of the economic recession in 2008 changed the macroeconomic picture in both Ireland and Italy substantially and it would be interesting to identify whether or not the introduction of decoupled payments managed to make a significant impact against such a background.

The paper is similar in some respects to the work on Italian crop farmers by Corsi & Salvioni. However, in comparison, a wider sample of farms is included in this study and over a longer time period, considering also many small farmers where, at least in theory, off-farm income

source should be more relevant.[1] In addition, we model the determination of labour hours and we provide a unique ex-post cross-country analysis regarding the impact of decoupling on off-farm employment. The paper draws from the literature on female labour supply and uses a sample selection corrected ordinary least squares model to examine both off farm work participation decisions and decisions regarding the amount of time spent working off-farm.

In the next section, we describe the conceptual framework behind the model used. This is followed in section 3 by a brief summary on the policy background. The methodology and data sections (4 and 5) offer a separate description of the data sources in each country. Section 6 discusses the regression results, followed finally by the conclusion.

2. Conceptual 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

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

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

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

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 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 output Y_f.

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.[2] The trade off between time spent farming

[1] For example, in the Corsi & Salvioni sample, the average farm size in UAA is equal to 53.37 ha., whereas the average size in our sample is 24.2 ha and 36.7 ha for the Italian and Irish samples, respectively.

[2] The household model can also include a technology constraint which constrains farm output to be a function of farm labour, human capital and farm-specific factors. This is excluded in this reduced form of the agricultural household model presented here, as the interest of this research lies in the empirical

and time spent off the farm is conceptualised diagrammatically by Sumner (1982) and is recreated in Donnellan & 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,

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

where $P(O_i = 1)$ is the probability of $O_i = 1$, that is participating in off-farm employment, which occurs if $w^r < w^i$, 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 w^i, 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.

3. Policy Background

Ireland and Italy are among 10 EU member states that decoupled EU direct payments from agricultural production in 2005 under the introduction of the Single Payment Scheme (SPS). A further seven member states followed this path in subsequent years while 10 new member states embarked upon the Single Area Payment Scheme (SAPS). Ireland in common with Luxembourg, Malta and the UK (excluding Scotland) decoupled all direct payments from production while Italy retained some coupling payments for certain crop production, like rice and tobacco. These reforms formed part of the Luxembourg Agreement on the reform of the CAP announced in September 2003.

On the introduction of the SPS, each member state had the option of choosing between three different implementation models: the historical model, the regional model, and the hybrid model. Ireland and Italy are among the majority of countries which chose to implement the historical model of payments. This meant that the allocation of entitlements became based on a historical reference period from 2000-02.

The adoption of the historical model limited the extent to which the reforms could impact directly on the distribution of farm income between farm households. In contrast to Ireland and Italy, the new member states (excluding Malta and Slovenia) implemented the regional model which set a uniform payment per hectare. A small number of countries (Denmark, Luxemburg, Sweden, Northern Ireland Finland, Germany, and England) embarked upon a hybrid version of the other two models.

Access to the SPS came with certain conditions for farmers. In order to access the scheme, farmers must have received direct payments during the reference period from 2000-02 and the reference amount is based upon the three year average of the total direct payments received in this reference period. Farmers are required to maintain the land 'in good agricultural and environmental condition' and furthermore that land under permanent pasture at the date of the area aid application is maintained under permanent pasture. O'Neill & Hanrahan (2012) explained that these requirements may have motivated some

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evaluation of the effect of government subsidies on the allocation of farmers' time and the interplay between farm and off-farm work.

farmers to keep land in agricultural use and that without such requirements the land would be left idle or converted to non-agricultural use. These conditions may in turn have some implications for the decision to enter off-farm employment.

As discussed in the previous sections, the effect of decoupling of farm payments on off-farm labour participation tends to be ambiguous (Serra et al., 2005). Indeed, on the one hand, we can expect a reduction of the relative return to (farm) labour, and thus economic theory would suggest that the probability of farmers participating in off-farm activities should increase. However, on the other hand, as decoupled payments are also a source of wealth for the farm household, the budget constraint would be relaxed and could reduce the need or desire for off-farm income (Dewbre & Mishra, 2007; Hennessy and Rehman, 2008). Thus, overall, which of the two effects will prevail is an empirical question that we address in the next sections.

4. Methodology

In this section, we describe the econometric methodology used to model the off-farm labour supply of farm operators in Ireland and Italy. 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:

$$OHRS_{it}^{*} = \beta_0 + \beta^{'}_{1} X_{1it}^{*} + \varepsilon_{1it} \tag{7}$$

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 $\beta^{'}_{1}$ 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:

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

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.

5. Data

In this section, we describe the data sources used for the analysis in both countries. 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 & 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 & 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.

The Italian analysis utilises the data from the Farm Business Survey (REA) carried out by the Italian Institute of Statistics (ISTAT). The database yearly surveys a sample of agricultural holdings representative of the Italian agriculture, stratified by regions, farm types and economic size of holdings. Besides a detailed set of variables on farm structure, the database includes household's composition variables as well as extra-farm source of income variables. The study covers an average of 3,573 farms per year, in a balanced panel that includes only farms surveyed for the entire period analysed.

The purpose to utilise almost the same list of variables for both countries induces the necessity to define some of them from the available data. Thus, the dependent variable 'off-farm work participation' of the holder is derived in the database from the existence of off-farm wage, while the 'amount of hours spent working off-farm' is obtained indirectly using the information related on the off-farm wage and on the hours worked on farm by the farmer.

Also some independent variables required a derivation from dataset information. The 'married' status of farmer comes from the spouse information, which could be not recorded however if he/she doesn't work in the farm nor earns any extra-farm income. In the same way, the 'number of family members living in the farm' and the 'number of young in the family farm', due to the nature of the available data that mainly include family members working on or off-farm, do not allow a precise estimation of family size and could underestimate the real dimension of these data. Finally, for binary variable 'Specialist Dairy' we report value 1 when farm belongs to business productivity activity of cow breeding and the number of cows is more than one, with a possible over-dimensioning of the unitary values.

The data for both countries covers the period from 2002 to 2009 and therefore includes three years prior to the decoupling reform in 2005 and the four years immediately after the reform. We use approximately the same list of variables from both datasets and the mean values for these variables are presented below in table 1.

Table 1. Mean value statistics for Italian and Irish data

	ITALY		IRELAND	
Dependent variables	Off-farm employed	Full sample	Off farm employed	Full sample
Off-farm job (Head)		23.0		36.3
Off-farm hours per annum	466.71	113.19	1572.35	570.65
Independent variables				
Age	53.40	55.78	48.98	54.35
Sex (= 1 male; 2 female)	1.29	1.34	1.03	1.05
Specialist dairy	0.0927	0.1388	0.0540	0.1571
UAA (ha)	15.11	24.18	27.47	36.72
Spouse (= 1 if work off-farm)	0.1146	0.0656	0.4190	0.3167
Married (= 1 if married)	0.3709	0.4114	0.7449	0.6730

Number of young in the family farm	0.0801	0.0465	0.8318	0.6278
Number of family members living in the farm	1.8457	1.9466	3.6214	3.2889
Number of family members working in the farm	0.2409	0.3482	N/A	N/A
Hired (= 1 if presence of hired workers)	0.2099	0.2617	0.1097	0.1827
Number of bovine on UAA	0.7564	0.8798	1.1429	1.3093
Decoupled payments	2,529	5,441	7,237	9,059
Coupled Income	2,517	3,936	2,636	7,780
Other subsidies (investment aids, organic payments ...)	442	630	2,676	2,764
Average number of farms each year	825	3,573	330	1,184

The mean values provided include both the dependent variables and the independent variables from our analysis. The values are presented separately for the entire sample and for the sub-sample of farm operators engaged in off-farm employment. In terms of the dependent variables, it is clear that off-farm employment is much more common among Irish farm operators than among Italian operators. Among those with off-farm employment, the Irish operators commit over three times the amount of off-farm labour relative to the Italian farm operators. Possible reasons for this deep difference could be linked to Italian indirect calculation of hours worked off-farm, previously described, as well as to the presence of not regular off-farm work that, as such, results not declared. The average number of 1,572 hours per annum for Irish operators lies slightly above that reported by Hennessy & Rehman (2006), which was based solely upon 2002 Teagasc NFS data.

Among the independent variables, the average age is very similar for farm operators in both countries. Italian farm operators have an average age of 55.78 years old compared to 54.35 years for Irish farm operators. The average age of Irish operators with off-farm employment is approximately four years younger than for the Irish sample as a whole. Italian farm operators are much more likely to be female than their Irish counterparts. The proportion of farms classified as specialist dairy is relatively close in both datasets. We find that Irish farms have much larger farm incomes both in terms of coupled and decoupled incomes along with larger farms. In addition, Irish farm operators receive much greater amounts in the form of other subsidies.

In terms of the remaining farm-level variables, it appears that the presence of hired workers is more common in the case of Italian farms with 26.2% of farms hiring labour compared to 18.3% in the case of Irish farms. The number of bovine units per UAA hectare is much higher on Irish farms. Average farm size is much greater in the case of the Irish farms. This finding is supported by Moreddu (2011) which provides results from the 2007 farm structure survey carried out in both countries. The farm structure survey includes farms of all sizes whereas the FADN database excludes farms with less than 4 European Size Unit (ESU) in the case of Italian farms and less than 2 ESU in the case of Irish farms.

In terms of household variables, we can see that the average household size is much smaller among the Italian farms relative to Irish farms. While Irish farms have on average higher income, the Irish farm household must support on average at least one more person. A much lower percentage of Italian farm operators are married relative to the Irish farm operators, and this is probably connected to the measurement problems of this variable described above. There are also deep differences in the proportion of farms where a spouse is engaged in off-farm employment. This proportion lies at just 6.6% in the case of Italian farms relative to 31.7% in the case of Irish farms. There appears to be some correlation between the off-farm employment of the operator and the spouse in the case of both countries. In both cases, the

proportion of farms with a spouse employed off-farm is greater among the sub-sample of farms where the operator is employed off-farm than for the sample as a whole. The Irish data does not provide for a variable regarding the number of other family members working on the farm.

6. Results

The results for the participation Probit model and the hours equation are presented in this section.

Table 2. Results for Probit analysis

DEPENDENT VARIABLE	IRELAND			ITALY		
Age	0.355***	0.347***	0.348***	0.061***	0.060***	0.054***
Age squared	-0.005***	-0.005***	-0.005***	-0.001***	-0.001***	-0.001***
Sex	-0.255	-0.276	-0.269	-0.140***	-0.143***	-0.151***
Specialist dairy	-1.389***	-1.347***	-1.379***	-0.478***	-0.481***	-0.548***
UAA (ha)	-0.006**	-0.005**	-0.006**	-0.004***	-0.005***	-0.003***
Spouse working off-farm	0.0309	0.0413	0.0369	1.486***	1.487***	1.482***
Married	0.657***	0.676***	0.664***	-0.696***	-0.698***	-0.703***
Number of young in HH	-0.223***	-0.231***	-0.228***	-0.029	-0.031	-0.032
Household size	0.198***	0.199***	0.198***	0.117***	0.118***	0.114**
Number of family members working on the farm				-0.220***	-0.222***	-0.219***
Hired workers (1,0)	-0.026	-0.028	-0.023	-0.200***	-0.204***	-0.196***
Number of bovine per UAA	-0.027***	-0.027***	-0.027***	-0.014**	-0.014**	-0.015*
Decoupled payments (in €10,000s)	-0.088			-0.003**		
Coupled income (in €10,000s)		-0.030			0.001	
Other subsidies			-0.008			-0.001
_cons	-7.410***	-7.243***	-7.263***	-1.655***	-2.517***	-2.123***

In terms of the impact of decoupling on off-farm work participation, it appears that there is a significant negative impact in the case of Italy, but no significant impact in the case of Ireland. It therefore appears from the Italian results that the wealth effect has dominated the relative wage effect and off-farm employment participation has responded positively as a consequence.

The differentiated impact of decoupled income on off-farm work participation in the two countries is interesting. From deeper analysis of the Irish data, it appears that the relative strength of the wage and wealth effects varies along the distribution of single farm payments but this requires further investigation. The difference could perhaps lie also in the combined effect of the level of average payments and off-farm wage in the two countries. Indeed, in the Italian sample, the corresponding per-farm average amount of decoupled payments, is only

59% of the Irish sample, a fraction that go down to 35% when only the farms with off-farm work are considered.[3] From this perspective, it is not simple to justify the above results. However, in several Italian south regions, the off-farm wage (and unemployment rate) is typically lower (higher) than in Ireland, a consideration that at least partially can recompose the above evidence.

Coupled income is not significant for either country. The summary statistics presented in Table 1 showed that coupled income is much lower for those Irish farmers engaged in off-farm employment relative to Irish farmers as a whole. The negative coefficient sign is therefore expected but it is not found to be significant. In the Italian case, the difference in average coupled income between those working off-farm and the rest does not appear to be so wide. It is therefore less surprising to find that coupled income is not a significant of off-farm work participation in the case of Italy.

For both countries, the presence of a specialist dairy farm reduces the likelihood of participation. We find that age is positively associated with off-farm employment participation in both countries but in a non-linear fashion as age squared is negative and significant. Interesting, the turning point of the relationship is also very close in the two samples, been equal to about 35 years in Ireland and 31 years in Italy. The off-farm employment participation of the spouse is found to have no significant impact upon the participation decision in Ireland, but a significant and positive one in Italy. The married status has a totally different effect in the two samples, pointing to a significant positive effect in Ireland, but to a significant negative effect in Italy. This huge discrepancy in results, however, could be simply due to a problem of under-reporting in the Italian sample, as discussed in the data section.

The number of young in the household is a negative contributor towards off-farm employment participation, although it is statistically significant only in Ireland. Finally, household size and the presence of hired workers, is respectively positively and negative associated with off-farm employment participation, but the last variable is statistically significant only for the Italian sample.

Table 3. Results for hours equation

DEPENDENT VARIABLE	IRELAND			ITALY		
Age	0.877***	0.895***	0.941***	0.29***	0.30***	0.29***
Agesq	-0.0132***	-0.0134***	-0.0140***	-0.00408***	-0.00417***	-0.00411***
Sex						
Specialist dairy	-4.257***	-4.150***	-4.500***	0.39	0.32	0.24
UAA (ha)	-0.0203*	-0.0180*	-0.0226**	0.01	0.01	0.02
Spouse working off-farm	-0.703***	-0.674***	-0.691***	4.42***	4.57***	4.54***
Married	0.483	0.545	0.612	-1.86**	-1.94**	-1.96**
Number of young	-0.364*	-0.388*	-0.412**	-0.45*	-0.46*	-0.49*
Number of family members living in the farm	0.0143	0.0318	0.0463	0.51**	0.53**	0.56***
Number of family members working in the farm				-0.57*	-0.60*	-0.61**

[3] Note that, differences in farm size, only partially can explain these numbers, suggesting that the reason could be attributable to differences in the types of farm activities.

Hired workers (1,0)	-0.217	-0.244	-0.214	0.15	0.12	0.12
Number of bovine on UAA	-0.0571**	-0.0597**	-0.0636***	-0.08***	-0.09***	-0.07***
Decoupled payments (x 10,000€)	-0.0468			-0.17***		
Coupled income		-0.172***			0.17***	
Other subsidies			-0.00333			0.13
Mills ratio	1.948**	2.050**	2.177**	1.13	1.26	1.23
_cons	2.791	2.396	1.389	-1.70	-2.27	-2.09

In interpreting the results for the hours equation, we should probably keep in mind that a fixed effects model is in place. The choice of fixed effects means that we do not capture the effect of covariates that display strong persistency and this could be particularly important for some variables that change little in value over time.

In the hours equation, and coherently with the Probit result, we find for Italy that decoupled payments have made a significant negative impact also on the number of hours supplied off-farm. Quantitatively, the magnitude of the estimated effect appears also relevant from an economic point of view, as a €10,000 increase in decoupled payments reduce off-farm labour of about 17 hours per annum. Decoupled payments are therefore found to have made a significant negative effect on both participation and hours supplied off-farm for the Italian case. In a neo-classical framework, this suggests a strong wealth effect. No significant impact is found in the Irish case but the negative sign is also apparent.

In the Irish case, the coupled income variable is found to have a significant negative effect on hours supplied. A €10,000 increase in coupled income on average reduces the off-farm labour participation by 17.2 hours per annum, a result virtually identical to the decoupled effect in Italy. Perhaps the main surprising result is that coupled income is found to have a positive effect upon hours supplied among Italian farmers, an effect of exactly the same order of magnitude.

As in the case of the participation equation, the age variable is significantly positive and non-linear for both countries. Now the turning point of the relationship, however, is significant higher but again fairly similar across sample (66 years for Ireland and 70 years for Italy). Farm size has a negative and significant impact on hours supplied among Irish farmers but no such relationship appears from the Italian results. Perhaps this reflects low variability in farm size over time in the case of the latter. The results also show that being a specialist dairy farmer has a significantly negative impact upon hours among Irish farmers but not among Italian farmers, a result that could be attributed to the way we are forced to estimated the dairy specialization in the Italian sample. In the Irish case, the presence of a dairy farm on average reduces hours by approximately 400 to 450 hours per annum depending upon the other variables included.

The off-farm work participation of the spouse appears to have a very strong positive effect in the Italian case which is perhaps unexpected. The off-farm employment of the spouse has a significant negative effect in the Irish case. This would imply some kind of trade-off taking place between the off-farm employment of the spouse and the number of off-farm hours supplied by the farm operator. We find that a married marital status has a significantly negative effect upon off-farm employment in the Italian data while in the Irish data there is a significant relationship between off-farm employment participation and marriage.

The number of young in the household is a negative contributor towards off-farm employment in both samples, and the effect appears to have greater significance in the case of participation than for hours. The intensity of livestock farming is unlikely to be among the

stable covariates and it appears as expected to have a significantly negative impact upon hours supplied in both countries.

Finally, in the Irish case, the significance of the inverse Mills ratio in the second stage means that sample selection is present. Farm operators engaging in off-farm employment are therefore found to have unobserved characteristics which make them more likely to engage in off-farm employment relative to the group not participating in off-farm work. A result quite different from the Italian sample where instead the Mills ratio is never significant.

7. Conclusion

This paper investigated the determinants of off-farm labour participation in Ireland and Italy with the aim of understanding the role played by decoupled payments in this important adjustment process. 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, which should increase the off-farm labour participation, and a wealth effect, which 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 in Ireland and Italy, have the expected significant effect, although some notable exceptions are present. The results suggest that decoupled payments have a negative effect on the off-farm participation decision and on the hours supply in the two samples, although this result is significantly different from zero only in the case of Italy. In light of the conceptual model framework, this result points to a wage effect that is dominated by the wealth effect.

We detected more differentiated results when coupled income amounts are considered. In particular, while coupled payments do not affect the off-farm labour participation in both countries, this effect turns out to be significantly negative in Ireland and significantly positive in Italy, in the hours supply equation. This is an unexpected result in the case of Italy. In the case of Ireland, the result is as expected where coupled income is negatively associated with off-farm hours.

Several reasons relating to both farm type characteristics and specific labour market conditions differences can be at work in driving this result. While the proportion of farms that can be described as specialist dairy is similar in both countries, there is much more reliance upon crops and tillage in the case of Italian farming. The characteristics of farms at the top and bottom of the coupled income distribution can therefore differ between both countries. In addition, farmers in both countries are likely to be affected by different income risks relating to weather, disease and other natural forces. In the case of Ireland, the off-farm job demands on average close to 30 hours of labour per week whereas the average number of hours is much lower in the case of Italy. Future refinement of the analysis calls for a deeper investigation of the differentiated factors that are at the root of the above findings.

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Comparative Analysis of Factor Markets for Agriculture across the Member States

245123-FP7-KBBE-2009-3

The Factor Markets project in a nutshell

Title	Comparative Analysis of Factor Markets for Agriculture across the Member States
Funding scheme	Collaborative Project (CP) / Small or medium scale focused research project
Coordinator	CEPS, Prof. Johan F.M. Swinnen
Duration	01/09/2010 – 31/08/2013 (36 months)
Short description	Well functioning factor markets are a crucial condition for the competitiveness and growth of agriculture and for rural development. At the same time, the functioning of the factor markets themselves are influenced by changes in agriculture and the rural economy, and in EU policies. Member state regulations and institutions affecting land, labour, and capital markets may cause important heterogeneity in the factor markets, which may have important effects on the functioning of the factor markets and on the interactions between factor markets and EU policies. The general objective of the FACTOR MARKETS project is to analyse the functioning of factor markets for agriculture in the EU-27, including the Candidate Countries. The FACTOR MARKETS project will compare the different markets, their institutional framework and their impact on agricultural development and structural change, as well as their impact on rural economies, for the Member States, Candidate Countries and the EU as a whole. The FACTOR MARKETS project will focus on capital, labour and land markets. The results of this study will contribute to a better understanding of the fundamental economic factors affecting EU agriculture, thus allowing better targeting of policies to improve the competitiveness of the sector.
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EU funding	1,979,023 €
EC Scientific officer	Dr. Hans-Jörg Lutzeyer