

Article

Off-Farm Employment and Economic Crisis: Evidence from Cyprus

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Abstract: Off-farm employment is an important strategy for complementing farm household income and maintaining rural livelihoods. A multilevel logistic regression model was applied to investigate the effect of farm-level and regional-level factors on off-farm employment in Cyprus during the recent economic crisis period. The performance of nonfarm sectors positively affects off-farm employment; a one-percent increase in the share of the secondary and tertiary sector employment increases the likelihood of off-farm work by 9.5 times. The importance of location was also identified. Farm households located in rural areas are 70% less likely to engage in off-farm work than households located in urban areas. The positive effect of educational attainment and the negative effect of farm training confirmed the importance of human capital characteristics on off-farm labour participation. Farm structural factors are also significant determinants of off-farm employment. A one-hectare increase in the farm size decreases the odds of off-farm labour participation by 50%. Operators of crop farming holdings are 4.2 times more likely to work off the farm than operators of livestock and mixed-farming holdings. The results reveal the importance of adopting a multilevel and integrated approach for the analysis of off-farm employment.

Keywords: off-farm employment; economic crisis; multilevel modelling; logistic regression model; contextual effects; education; farm size; farm type; Cyprus

1. Introduction

European rural regions have been undergoing significant structural changes. The successive Common Agricultural Policy (CAP) reforms, the international trade liberalisation, and the rapid growth of nonagricultural sectors have created new opportunities and challenges for the European countryside. Agriculture is no longer the backbone of most rural economies, and is neither necessary nor sufficient for generating and maintaining high income and employment shares in rural areas [1]. Emerging sectors, including the food manufacturing industry and tourism sector, create strong backward and forward linkages in many rural communities, complementing and/or replacing agriculture in this role [2]. A less protective framework for agriculture, including a reduction in CAP subsidies, may further push farmers to search for other forms of stable income or to leave agriculture [3].

Engaging in off-farm employment has been considered an important strategy for maintaining rural livelihoods through the stabilization of the farm household income [1]. Several studies have showed that off-farm employment is complementary to farm work and slows down the exit from agriculture [4,5]. Conversely, other studies support that off-farm employment fosters the structural change in agriculture [6].

The first wave of studies exploring off-farm work, and more broadly ‘pluriactivity’, emerged during the 1980s and 1990s [7–9]. Off-farm diversification was later discussed in periods of agricultural policy reforms, e.g., the decoupling of subsidies from production [10,11]. However, the study of off-farm employment during economic downturn periods is limited. Understanding the factors affecting farmers’ off-farm labour decisions during recessionary periods has significant implications for agricultural and rural development policy.

Over the last decade, European countries and regions have experienced a period of severe economic downturn [12]. Cyprus, along with Greece and Spain, experienced the largest losses in employment and economic output among European countries (Figure 1). More precisely, Cyprus entered into recession in 2012, and its economic output was reduced for three consecutive years (2012–2014) with a total loss of 10.3%, while the total loss of employment was also around 10%. During this period, the unemployment rate almost doubled, from 7.9% in 2011 to 16.1% in 2014 [13]. The greatest job losses were observed in the construction sector and the services sector, resulting in declining opportunities for off-farm employment.

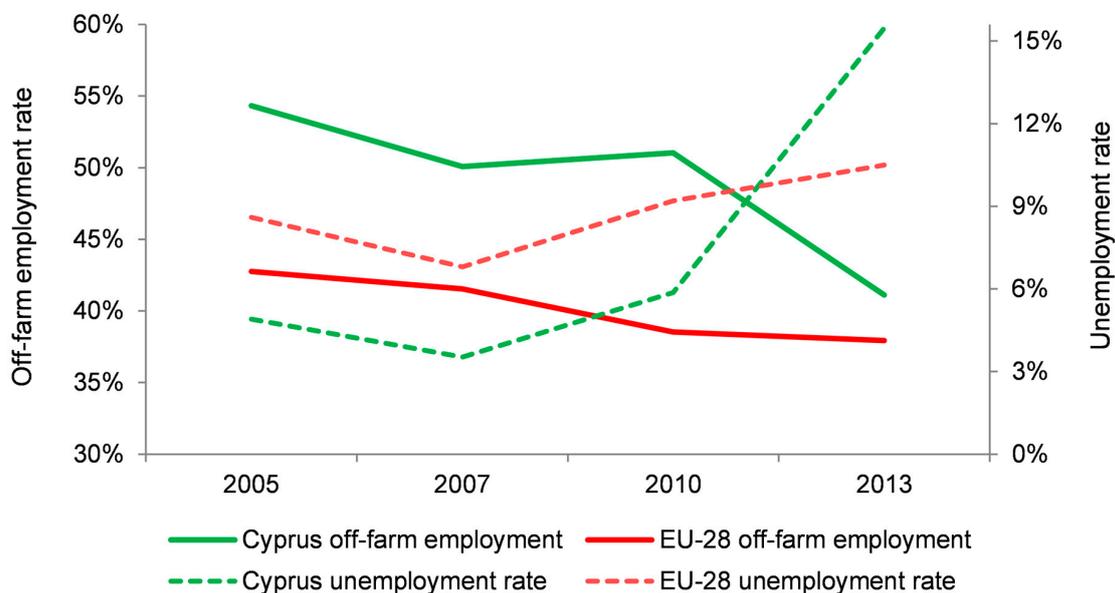


Figure 1. Cyprus and European Union (EU)-28 off-farm employment and unemployment rates, 2005–2013. Sources: European Commission [14]; Eurostat [15].

The engagement of farmers in other gainful activities in the European Union (EU)-28 was reduced from 42% to 38% between 2007 and 2013, i.e., the period of economic crisis in Europe. Before the economic downturn, around half of Cypriot farmers were engaged in gainful activities other than farm work. From 2010 to 2013, i.e., the recession period in Cyprus, the share of ‘pluriactive’ farmers declined from 51% to 41%. At the member state level, Bulgaria and Sweden registered the highest share of farmers being engaged in off-farm employment (73%) in 2013, while Belgium had the lowest share (13%).

This paper aims to analyse the factors affecting the off-farm labour decisions of Cypriot farmers, using a representative survey of 193 farmers. We aim to contribute to the off-farm employment literature along two main directions. First, we examine the effects of individual, farm household, and farm holding characteristics (microlevel) and location (spatial-level) on farmers’ engagement in off-farm work during the recent economic crisis. Second, we assess the magnitude of contextual effects on off-farm employment in Cyprus.

2. Conceptual Framework

Several studies of off-farm employment have focused on the factors affecting participation in the off-farm labour supply (e.g., [1,16]). Off-farm labour decisions by the principal farm operator are affected by individual, farm household, farm holding, social capital, and spatial characteristics [1].

2.1. Individual Characteristics

Human capital characteristics, i.e., age and education, significantly affect the farmer's decision to allocate his/her work in off-farm activities. Several studies have showed that younger farmers are more likely to work off the farm [1,17]. Higher education levels have been positively associated with higher off-farm wages, implying greater willingness to seek off-farm employment [1,18]. On the other hand, higher education may increase the productivity of farm work, thus discouraging off-farm participation [19]. Farm training typically raises the earning capacity of the farm business, and therefore usually implies reduced willingness for off-farm employment [20].

2.2. Farm Household Characteristics

The size of the farm household can be an important factor for motivating participation in nonfarm labour markets. Having more family members increases the need for additional income that is expected to be positively related to off-farm activities [10,16]. Additionally, a larger household can more easily divide on-farm work than a smaller one, thus releasing some of the family members to work off-farm [3]. Farm succession can also influence off-farm labour decisions, as it affects the structure of farm holdings, thus providing the incentive to develop and expand farm activities over long periods [21]. The availability of a successor within the farm family is directly linked with farm survival [22].

2.3. Farm Holding Characteristics

Farm size, expressed in physical, labour, or economic output units, is expected to affect off-farm labour decisions. Larger farms, as measured in any way, typically require more labour on the farm, thus resulting in fewer hours available for off-farm work [1,10,17]. The type of farming operation, i.e., crop farming, animal farming, and mixed farming, affect the engagement of farm operators in off-farm employment; labour-intensive farming, e.g., livestock operations, requires a constant presence of the operator on the farm, compared with less-intensive types of farming, e.g., field and permanent cropping [1,17].

2.4. Social Capital

The social capital in agriculture, defined as the shared knowledge and trust embodied in the relationships between farmers, can be an important determinant of off-farm employment [23]. It is usually expressed by farmers' memberships of organizations, participation in social networks, and access to information and knowledge. Farmers' participation in rural development policy schemes is expected to negatively affect the participation of farm operators in nonfarm labour markets, as they commit themselves to maintaining farming for a specific period of time.

2.5. Spatial Features

Farmers' participation in off-farm labour markets is affected not only by their willingness and ability to supply labour, but also by the demand for this labour [24]. Spatial features, including the accessibility and the availability of employment, affect farmers' likelihood to work off the farm. The location of farm households can capture the geographic heterogeneity and the urbanization effect. Sparsely populated areas are less business-intensive with fewer off-farm employment opportunities than areas with high population densities [3,18]. Local labour market characteristics shape the propensity of farmers to work off the farm. It is expected that multiple job-holding, i.e., farm and

nonfarm, will be more prevalent in locations where there is significant employment in the secondary and tertiary sectors [1,25]. In locations where local labour markets operate inefficiently or the demand for labour outside agriculture is low, it is expected that off-farm labour will be less prevalent [1,17]. The performance of the local labour markets is typically reflected in the unemployment rate of the community in which the farm household is located [1].

2.6. Analytical Methods

Farmers' decisions for off-farm labour are significantly affected by regional-level and farm-level factors. Multilevel modelling is suitable when data are hierarchically structured, i.e., consisting of units grouped at different levels of a hierarchy [26]. Multilevel regression models are being increasingly applied in regional labour market studies [12] and rural development studies [27].

3. Data and Methodology

3.1. Data Collection

The farm household survey was implemented between January and May 2013 in the five districts of Cyprus, namely, Lefkosia, Lemesos, Larnaka, Pafos, and Ammochostos. Farm households were identified in each district through census data [28]; a sample of 200 farm households, that is, 0.5% of the total number of farm households in Cyprus, was randomly selected across the five districts. The distribution of the surveyed farm households by district and rural/urban areas is presented in Figure 2. The definition of rural/urban areas in Cyprus follows the regional typology definition of the Organisation for Economic Co-operation and Development (OECD) [29], which is based on the population density criterion. For more details on the definition of rural areas in Cyprus, see Giannakis [30].

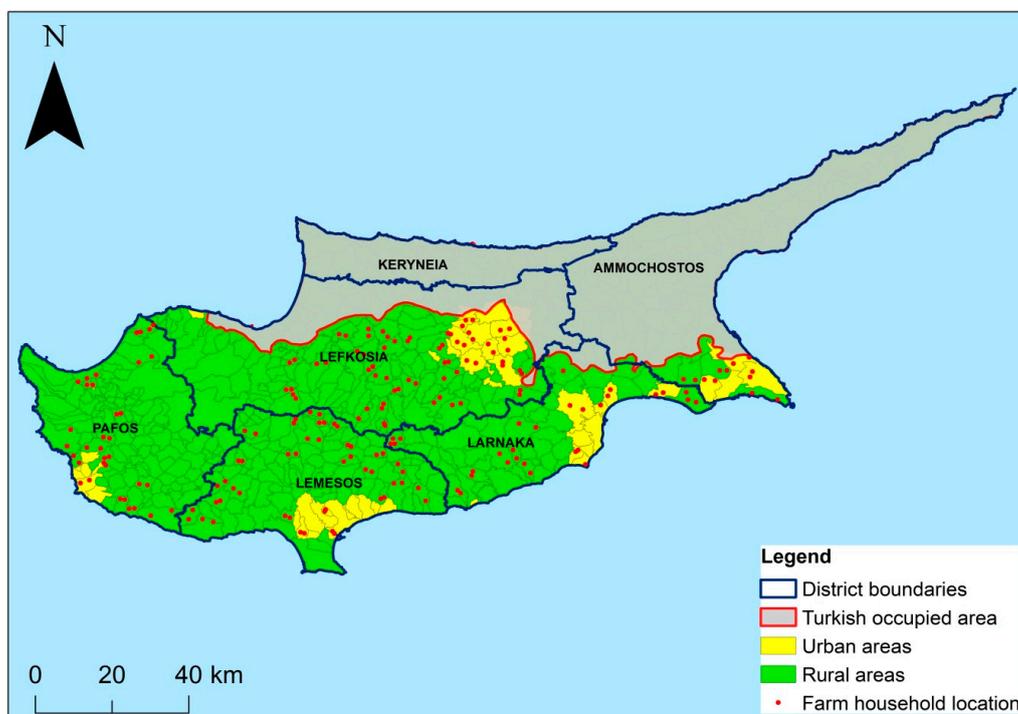


Figure 2. Distribution of surveyed farm households by district and rural/urban areas.

Face-to-face interviews were conducted with the farm operators, i.e., those responsible for making farming decisions. Farmers were contacted and informed of the study, and those that agreed to participate in the survey were subsequently interviewed. As a result of the face-to-face household

visit survey mode used in this study, the response rate was high (96.5%), i.e., of the 200 farm operators contacted, 193 farmers were interviewed, thus yielding in 193 completed questionnaires. Table 1 presents the farm holdings in Cyprus and the surveyed farm households by district.

Table 1. Farm holdings in Cyprus and surveyed farm households by district.

Districts of Cyprus	Cyprus		Survey Sample	
	Number	Percent (%)	Number	Percent (%)
Lefkosia	13,592	35.0	67	34.7
Lemesos	10,144	26.1	50	25.9
Larnaka	5816	15.0	29	15.0
Pafos	6926	17.8	35	18.1
Ammochostos	2381	6.1	12	6.2
Total	38,859	100	193	100

Source: CYSTAT [28]; survey data.

3.2. Questionnaire Design and Sample Description

The questionnaire was designed by the authors after a thorough review of previous research and taking into account the farm structures of Cyprus [31,32]. More precisely, the questionnaire gathered data on five main topics: (a) socio-demographic characteristics of the farm household members (age, education, number of household members); (b) employment status of the farm operator (employment on- and off-farm, days of employment); (c) structural characteristics of the farm holding (farm size, ownership, composition of farm, and livestock production); (d) social capital (sources of information and membership in associations); and (e) knowledge and participation in rural development programme measures. These data were supplemented by community-/municipality-level sectoral employment and unemployment data from the Statistical Service of Cyprus. The questionnaire was pilot-tested with 10 farmers on an individual basis. Based on the results of the pilot testing, several individual questions were slightly rephrased and/or reordered.

Sixty-three percent of the surveyed farm operators were full-time employed in farm activities, while 37% were engaged in off-farm employment. The nonfarm sectors in which farmers were most engaged were construction (28%), trade (10%), and transportation (10%). About 60% of the 'pluriactive' farmers worked off the farm for 180–220 days, thirty percent worked off the farm for more than 220 days, while only ten percent worked off-farm for fewer than 180 days. The highest shares of farmers engaged in off-farm employment were observed in Lefkosia (40%), i.e., the capital of the island, and Lemesos (42%), while the lowest was observed in Ammochostos district (25%).

The average size of the sampled farm holdings was 1 ha, of which on average 24% was irrigated. National surveys suggest a higher average farm size in Cyprus, that is, 3 ha, of which 29% is irrigated. The main cultivations grown on the sampled farms include cereals, olive trees, vineyards, potatoes, and vegetables, while livestock mainly includes sheep and goats, and to a lesser extent beef and dairy cattle.

3.3. Variables

Within this study, the decision of a farm operator to participate in off-farm employment is a function of both level-1 (farm-level) and level-2 (regional-level) explanatory variables. Farm-level variables include individual characteristics (age, education, gender, farm training), farm household characteristics (number of household members, succession), farm holding characteristics (farm size, type of farming), social capital-related factors (membership in farm union, sources of technical advice), and policy-related factors (participation in rural development programmes). Regional-level variables include the location of the farm household in rural or urban communities and the structure of the local labour markets (share of nonagricultural employment, unemployment). The definitions and descriptive statistics of all predictor variables used in the analysis are shown in Table 2.

Table 2. Description of the explanatory variables used in the multilevel logistic regression model and key summary statistics for the 193 surveyed farmers in Cyprus.

Explanatory Variables	Definition	Min	Max	Mean
Level-1 (farm-level) explanatory variables				
AGE	Farmer’s age (years)	25	71	51
EDUC	Farmer’s educational attainment; defined equal to 1 if the farmer has postsecondary and tertiary education and 0 otherwise	0	1	0.32
GENDER	Farmer’s gender; defined equal to 1 if the farmer is male and 0 otherwise	0	1	0.88
FTRAIN	Farm training; defined equal to 1 if the farmer has followed official farm training and 0 otherwise	0	1	0.58
HOUSE	Farm household members (persons)	1	7	2.7
SUCC	Succession; defined equal to 1 if the farmer has identified a successor and 0 otherwise	0	1	0.45
FSIZE	Farm size (hectares) ¹	0	4	1
FTYPE	Type of farming; defined equal to 1 for holdings engaged in crop farming activities, and 0 for holdings engaged in animal farming and mixed farming activities ²	0	1	0.68
FUNION	Farm union; defined equal to 1 if the farmer is a member of a farm union and 0 otherwise	0	1	0.45
TECADV	Technical advice; defined equal to 1 if the farmer uses more than one source of technical advice	0	1	0.48
RURDEV	Participation (current or past) in rural development programme measures; defined equal to 1 if the farmer has participated in a rural development measure and 0 otherwise	0	1	0.51
Level-2 (regional-level) explanatory variables				
RURURB	Geographic location of the farm household; defined equal to 1 if the farm household is located in rural regions and 0 if the farm household is located in urban regions	0	1	0.77
NONFARM	Share of nonfarm employment in the local (community/municipality) labour markets (%); 2013	27	98	88
UNEMPLO	Unemployment rate in the local (community/municipality) labour markets (%); 2011	3	30	12

¹ There are two pure animal holdings in the sample with 0 ha agricultural land. According to the Census of Agriculture 2010, 1.4% of the farm holdings in Cyprus are pure animal holdings, of which 92% are with no agricultural land. ² One dummy variable was used to reflect farm typology; considering that the share of pure animal holdings in the total number of farms is minor, that is, 1%, pure animal holdings were merged with mixed farming holdings in one category.

3.4. Methodology

The empirical framework of the study is based on a multilevel model that distinguishes two levels of analysis, i.e., the farm-level and the regional-level. More specifically, farmers’ decision-making process is nested within regional-level data and can be formalised as a discrete choice model.

Assuming that for the dichotomous choice of engaging or non-engaging in off-farm work (y_{ij}), there is a continuous latent variable (y_{ij}^*) that is related to (y_{ij}) as follows:

$$y_{ij} = \begin{cases} 1 & \text{if } y_{ij}^* \geq 0 \\ 0 & \text{if } y_{ij}^* < 0 \end{cases} \tag{1}$$

A two-level random intercept model can be applied in terms of a latent response variable (y_{ij}^*) as follows:

$$y_{ij}^* = \beta_0 + \beta_1 x_{ij} + u_j + e_{ij}^* \tag{2}$$

where x_{ij} is a set of 14 covariates, i.e., farmer characteristics, farm holding characteristics, spatial factors, and others; and e_{ij}^* is the farm (level-1) residual and u_j is the regional (level-2) residual. The total variance is partitioned into the regional-level residual variance (σ_u^2) and the farm-level residual variance (σ_e^2) [33]. The variance partition coefficient (VPC) measures the proportion of the residual variability in off-farm employment that is attributed to between-communities variation, and is given by the following formula [34]:

$$VPC = \frac{\sigma_u^2}{\sigma_u^2 + \sigma_e^2} \tag{3}$$

The farm-level residual (e_{ij}^*) is assumed to be distributed as a standard logistic distribution with variance equal to $\pi^2/3$, that is, 3.29 [34].

Odds ratios are used in the analysis of the results as the coefficients of the random intercept logistic regression model indicate the direction of the effect, but do not provide any evidence about the size [26]. The variance inflation factor (VIF) was used to test and quantify the severity of multicollinearity of the explanatory variables of the model. All calculations were done in STATA 12 (StataCorp, College Station, TX, USA) econometric software package.

4. Results

We estimate two specifications of the multilevel logistic regression model (Table 3): (a) with only level-1 variables (model 1); (b) including both level-1 and level-2 variables (model-2). We observe that the odds ratios of the level-1 variables do not change significantly after including level-2 variables in the model, thus suggesting that farm and farmer characteristics have a robust effect on farmers' engagement in off-farm employment. The variance partition component (VPC) of the model, which reflects the between-group variance, reduces from 0.526 to 0.301 when regional variables are included, thus highlighting the importance of including level-2 variables in the model. More precisely, the VPC indicates that 30.1% of the variance in the probability of a farmer to work off the farm is attributable to unobserved regional features.

Table 3. Multilevel logistic regression odds ratios and significance of farm-level and regional-level determinants of off-farm employment.

Explanatory Variables	Model 1			Model 2		
	Odds Ratio	Std. Error	<i>p</i>	Odds Ratio	Std. Error	<i>p</i>
Level-1 (farm-level) explanatory variables						
AGE	0.95	0.04	0.183	0.96	0.04	0.282
EDUC	3.09	1.98	0.078	3.11	1.90	0.063
GENDER	0.72	0.56	0.677	0.52	0.40	0.402
FTRAIN	0.23	0.14	0.012	0.38	0.22	0.097
HOUSE	1.78	0.36	0.004	1.80	0.37	0.004
SUCC	1.28	0.70	0.652	1.22	0.66	0.709
FSIZE	0.51	0.16	0.035	0.50	0.16	0.034
FTYPE	4.25	2.69	0.022	4.21	2.66	0.023
FUNION	0.85	0.49	0.782	1.03	0.57	0.950
TECADV	2.52	1.49	0.117	2.47	1.46	0.124
RURDEV	0.49	0.27	0.193	0.47	0.25	0.165
Level-2 (regional-level) explanatory variables						
RURURB				0.30	0.21	0.086
NONFARM				9.52	7.72	0.005
UNEMPLO				0.83	0.50	0.751
Constant	1.29	3.19	0.917	1.27	3.16	0.923
Between-group variance						
Var(const)	3.65	2.58	0.004	1.42	0.89	0.034
Observations		193			193	
Log-likelihood		−91.8			−82.5	
p-value		0.009			0.022	
VPC		0.526			0.301	

The odds for farmers with postsecondary and tertiary education (EDUC) to participate in off-farm work are 3.1 times greater than farmers with a lower level of education. On the contrary, farm training (FTRAIN) is negatively associated with off-farm employment; i.e., trained farmers are 62% less likely to work off the farm than farmers with practical experience only. We note that the larger the farm household size (HOUSE), the higher the likelihood of off-farm labour participation; an increase in the household size by one person increases the likelihood of working off-farm by 80%.

When looking at the farm holding characteristics, we find that farm size (FSIZE) is negatively associated with the decision of operators to work off the farm, i.e., a one-hectare increase decreases

the odds of off-farm labour participation by 50%. The type of farming (FTYPE) is also a significant determinant for off-farm employment. Operators of crop farming holdings have a 4.2-times higher probability to work off-farm than operators of livestock and mixed-farming holdings. With regard to explanatory variables concerning social capital and participation in rural policy support schemes, we find no significant effects on off-farm employment.

Farm households located in rural areas (RURURB) are 70% less likely to engage in off-farm work than households located in urban areas. The share of nonfarm employment in the local labour markets (NONFARM) has the greatest positive effect in the likelihood of off-farm labour participation. More precisely, an increase in the share of secondary and tertiary employment by 1% increases the odds of off-farm work by 9.5 times. The negative effect of unemployment in off-farm work is not statistically significant.

5. Discussion

The findings of the analysis highlight the magnitude of regional features, i.e., contextual effects, on the off-farm labour decision process. Farm households located in rural areas are less likely to work off the farm. Chang and Yen [18] found that farm households located in the urban and town areas of Taiwan are more likely to work off the farm, compared to households located in villages. Similar urbanization effects on off-farm employment are reported for Dutch farmers living close to large cities [3]. Wu et al. [35] found that urbanization in California, Idaho, Oregon, and Washington is associated with higher production costs compared to rural localities, which are however outweighed by higher prices for agricultural products and increased off-farm job opportunities, thus resulting in net farm income increases.

The outcomes of the analysis underline the importance of the presence of the nonagricultural economic sectors. Chang and Boisvert [25] found that farm operators engaging in labour markets that depend on manufacturing jobs are more likely to work off the farm. Similarly, Alasia et al. [1] reported that both manufacturing and services employment have a positive impact on the likelihood of off-farm labour participation. Our farm household survey in Cyprus revealed that the main reasons for farmers to work off the farm were: (a) increase of household income (44%) and (b) opportunities and prospects in the nonfarm labour market (19%). Lemesos (42%) and Lefkosia (40%) are the districts with the highest share of farm operators engaged in off-farm employment, which can be partially attributed to the rapid development of the services sector [32]. On the contrary, Ammochostos district has the lowest share of farmers working off the farm (25%), which can be attributed to the dynamic and export-oriented local agricultural sector (e.g., potato cultivation).

Apart from the regional features, our model results suggest that human capital and in particular education are major determinants for off-farm labour participation. Alasia et al. [1] explored the off-farm labour decisions of Canadian farm operators, and found a positive association between educational attainment and off-farm work. Our findings highlight the negative effect of farm training on the engagement in off-farm work. Weiss [20] investigated the off-farm labour market behaviour of Upper Austrian farm households, and found that the transition of a farm operator from the lowest to the next level of farm education decreases the likelihood of off-farm work by 1.65%. Farm training improves the knowledge and skills of farmers, fosters the adoption of new technologies, and positively contributes to the economic performance of the agricultural sector [36,37]. Our analysis shows that the size of the farm household positively affects the participation in off-farm work. Van Leeuwen and Dekkers [3] found a positive association between the farm household size and the off-farm income in the Netherlands; one extra household member was related to 4% more off-farm income.

Farm size seems to negatively affect the likelihood of off-farm labour participation. Alasia et al. [1] found that for the Canadian operators of both smaller and larger holdings, there is an inverse and significant relationship between farm size and off-farm employment. Conversely, Bjørn and Bjørnsen [17] analysed the labour market transitions of Norwegian farm households, and found that the larger the farm area, the higher the off-farm labour participation. Our findings suggest that

operators of holdings solely engaged in crop farming activities are more likely to work off the farm. Bjørn and Bjørnsen [17] found a negative association of livestock and off-farm participation in Norway. Alasia et al. [1] reported a negative relationship between dairy farming and off-farm employment in Canada, while van Leeuwen and Dekkers [3] found a positive association of dairy farming and arable farming with off-farm income in the Netherlands.

The results of our analysis did not indicate a statistically significant relationship between unemployment and off-farm work, even though the farm household survey was conducted during the recent economic crisis that severely hit the economy of Cyprus. A possible explanation could be the nonsignificant variance of unemployment across communities, which reflects high labour mobility among local labour markets. Future research could incorporate time-series information to better understand off-farm labour decisions during economic crisis and economic growth periods.

Regional context is highly affected by policies implemented at the spatial level. Among them, rural development policy is a key 'place-based' policy to promote the diversification of economic activities in European rural areas [38]. The evolution and the subsequent reforms of the Common Agricultural Policy have allocated additional resources for rural development to stimulate rural employment; that is, jobs located in rural areas, but not necessarily linked with the production of agricultural goods. Regional policies also encourage the development of small- and medium-sized enterprises in rural areas to diversify their economic base [39]. The integration of rural development policy with regional and cohesion policies in a common strategic framework can further enhance their capacity to invigorate rural employment [40].

6. Conclusions

The results of the study indicate that the operation of large scale farming, farm training, engagement in animal farming, and the location of farm households in rural areas impede the participation of farmers in off-farm employment. Our findings reveal that the structure of the local labour markets, i.e., the share and the performance of the industry and the services sector, is the factor with the highest impact on off-farm employment. The significance and the magnitude of the determinants of off-farm employment are strongly affected by contextual effects, which reinforce the need of adopting an integrated and multilevel approach for the analysis of this complex issue. A better harmonisation of rural development policies with regional policies can further enhance the economic diversification of rural areas and the associated off-farm employment opportunities.

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