Determinants to Leave Agriculture and Change Occupational Sector: Evidence from an Enlarged EU

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Paper prepared for presentation at the 87th Annual Conference of the Agricultural Economics Society, University of Warwick, United Kingdom

8 - 10 April 2013

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The authors gratefully acknowledge financial support from the European Commission FP7 project "Comparative Analysis of Factor Markets for Agriculture across the Member States" (245123-FP7-KBBE-2009-3)

Abstract

The objective of the paper is to explore the determinants to leave agriculture and change occupational sector. We adopt a 3-step multivariate probit where we control for selection bias at two stages in the decisions to work and, at a later stage, exit agriculture. The analysis is based on the European Labour Force Survey data expanded with additional regional indicators. The main results suggest that younger individuals are more likely to leave farming activities, although the largest outflows of agricultural labour are mainly associated with the retirement of people. Self-employed and family workers are generally less likely to leave agriculture and those with low levels of educations are found to be significantly constrained in entering the non-farm economy. Moreover, labour market conditions at the regional level do matter for switching occupational sector. Differences in the results among the selected NMS and the EU-15 can be explained by the diverse production structures, suggesting different capacities to release and absorb labour.

Keywords: Agricultural Employment; Labour mobility; Sample Selection Bias

JEL code: J24, J43, J62, Q12

1. Introduction

Understanding the labour allocation decisions of farmers has always been of great interest to academic and policy communities. In the literature, several studies have focussed on the determinants of off-farm participation, the amount of labour supplied to non-agricultural activities and the factors affecting farm exit decisions. Human capital and life-cycle theories are the most influential explanations for understanding the mobility of agricultural labour (Huffman, 1980; Rizov and Swinnen, 2004), although differences among regions and countries, which reflect the development level, the relative importance of agriculture and the farm structure, are also important. Since rural development depends on the existence of a competitive multi-sectoral economy, it is fundamental to understand the factors that determine the reallocation of agricultural labour across sectors and the impediments which may hinder its mobility (Dries and Swinnen, 2002).

The large share of employment in agriculture, often characterised by a surplus of labour and hidden unemployment, implies that agriculture can provide a minimum source of income for those less skilled, older and generally less mobile individuals. In the context of an enlarged EU, where the structure of the agricultural sector presents heterogeneous conditions across Member States (MSs), it becomes important to examine the differences within labour markets and investigate whether the low mobility of workers reflects the presence of some severe impediments. Whereas preferences and pride related motives may exist for being engaged in farming activities in some more advanced economies, structural constraints and market imperfections may instead be the main barriers for entry in non-farm jobs in some other less developed markets.

The objective of the paper is twofold: first to examine the push and pull factors which allow agricultural labour to enter non-farm activities; and second to compare some NMS (Hungary, Slovakia and Poland) to some of the EU-15 (France and Italy). The selection of countries reflects our attempt to capture the substantial differences which exist across their structural organisations of the farms, in terms of economic size and production system, and thus labour intensities, and their functioning of the labour market. Therefore, we explore to what extent differences in the farm structure and regional labour market conditions matter for structural change.

We adopt a cautious rigorous approach to control for selection bias, which may arise in the presence of a non-random sample of the population (Heckman, 1979). Previous studies analysing the decisions of labour allocation from agricultural census data rely on a restricted sample, i.e. the sub-population who work on agricultural holdings. Some unobserved factors

which affect the probability of working in agriculture in the first place may introduce a bias and thus need to be controlled for. The proposed approach seeks to identify the 'best' bundle of characteristics to establish a first occupational match and work in agriculture and then model individuals' decisions to exit farming. The possible destinations for the labour outflows include unemployment, retirement (and other forms of inactivity) and other occupational sectors. Hence, the focus of the paper is to examine the determinants of a sectoral switch.

The remainder of the paper is structured as follows. The next section presents some trends in agricultural employment and structural change over the last two decades and proceeds with the description of the data. The empirical methodology is explained in Section 3. Section 4 discusses the results and Section 5 concludes.

2. Empirical Trends, Data, and Descriptive Statistics

2.1 Trends and Differences in Agricultural Employment

The level of agricultural employment in the EU has been declining quite fast in the last two decades.[1] The different paths of structural change (decline in total numbers and respective shares) are depicted in Figure 1, comparing the five MSs under analysis since the 1990s.

In particular, the largest drops are associated with the first years of transition, with special regards to Hungary and Poland. In the last decade the primary sector has experienced sharp reductions in the total number of people, with overall change ranging from -46.4% in Slovakia to -20.8% in Italy, and respectively: -33% in Hungary, -24.8% in Poland, and -21.7% in France. The sharp decline in the number of agricultural holdings, particularly in Slovakia and Hungary, would therefore suggest that structural change remains an 'ongoing process' (Eurostat, 2012).

[1] Several factors have contributed to this trend: firstly, higher growth and economic development have facilitated the expansion of the industrial and services sectors, which have allowed a reallocation of labour from agriculture to non-farm activities. Secondly, the process of transition has had a deep impact on the economic structure of several NMS: whether agricultural employment dramatically decreased across some CEE countries, in some other countries agriculture played a buffer role in absorbing labour from other sectors. Thirdly, following entry into the EU, NMS have been experiencing a deep restructuring of their agricultural sector, with several adjustments in the labour market, which have also led to an outflow of labour from agriculture.

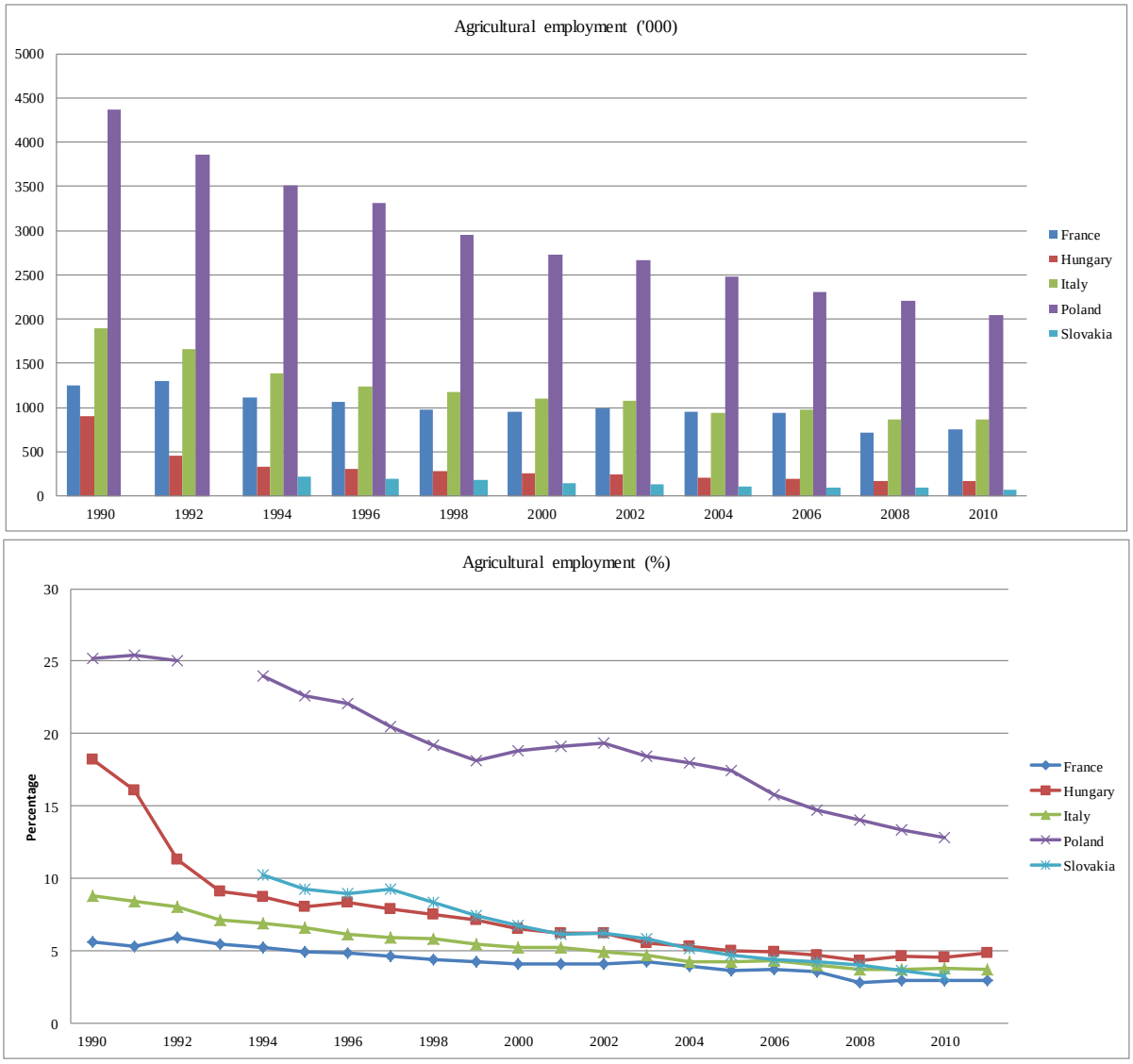

Figure 1. Trends in structural change, 1990-2010.

Source: Own figure based on ILO data, KILM database.

Despite the diminishing share in agricultural employment, in 2010 the sector still represents an important source of income and development for the rural community, providing labour for around 2,049,900 people in Poland, accounting for 12.8% of total employment[2]. The other figures include: Italy with 866,800 people (3.8%), France with 749,800 people (2.9%), Hungary with 168,700 (3.8%) and Slovakia 74,900 (3.2%).

[2] This represents the second largest figure in the EU-27 in absolute and relative numbers following Romania with 2,779,900 people, equivalent to 30.1% of total employment.

2.2 Data and Variables

The dataset used in the analysis is the European Union Labour Force Survey (EU-LFS)[3]. The harmonised micro-data can be exploited to analyse the labour allocation decisions of the same individuals across two consecutive periods, namely the year in which individuals are interviewed (period t) and one year prior to the survey (t-1). The main variables of interest include demographic background, socio-economic factors, and employment characteristics. The information on the individuals' region of residence (t-1) allow us to merge additional macro indicators to take into account of different economic and labour market conditions as well as farm structures across regions (European NUTS-2 level). These additional variables are extracted from other online sources, respectively the Eurostat New Cronos Database and the Farm Structure Survey (FSS). Due to data constraints we are only able to pool cross sections for three alternate LFS, specifically 2004, 2006 and 2008; matching individuals' responses for t-1 leave us with the following period of analysis: 2003-08.

The objective of the study is twofold: firstly we aim to explore the determinants of agricultural workers to switch occupational sector, and thus we examine the main push and pull factors which would allow a reallocation of labour from agriculture to non-farm activities. Secondly, we compare some NMS (Hungary, Slovakia and Poland) to some EU-15 countries (France and Italy) to explore the importance of farm structure and regional labour market conditions for labour adjustments. For this reason, rather than merging the data into a unique and heterogeneous sample we run separate estimations for the five countries.

Consistent with our empirical methodology (discussed in the next section) we have three different sub-samples of people: a) those in total employment[4], b) those in agricultural employment, and lastly c) those who exit agriculture. Hence, the three dependent variables, constructed as dummies, measure the sequential probability of a labour decision to occur, respectively the likelihood of working in agriculture (agriempl=1), conditional on this leaving the farm sector (leave=1), and lastly switching occupational sector (otherempl=1).

In addition to the working status and economic sector used to construct the dependent variables, the covariates used in the analysis control for individuals' gender, age, educational level, field of education, marital status, presence of children and professional status. The NUTS-2 regional indicators comprise the following: a proxy for the share of part-time labour in agriculture, population density, unemployment rate, wage ratio (non-farm to farm sector),

[3] The EU-LFS is a large household sample survey providing detailed information on labour participation of people aged 15 and over as well as on persons outside the labour force.

[4] We consider all persons in employment among those considered to be of working age (15 to 64 years old), living in private households and residing in the same country one year prior to the survey.

labour ratio (non-farm to farm employment), a proxy for agricultural abundant areas, farm size and farm production structure[5]. Dummies for the different LFS years which have been pooled are included[6]. A detailed definition of the independent variables can be found in Appendix (Table A.1).

2.3 Descriptive Statistics

The summary statistics of the total sample are presented in Appendix (Table A.2).[7] We are particularly interested in the descriptive statistics of the agricultural sample and the differences across MSs. The agricultural sector is generally characterised by low levels of education, with trends varying from Slovakia (14%) to Italy (71%). In general, most of the agricultural workers have attained medium education (with the exception of Italy), although the share of high education is much inferior in comparison to other sectors. Moreover, the majority of workers are above 45 years old, with almost 20% aged 55-64. The diverse conditions of the agricultural sector are well described by the different types of workers, so that employees represent a majority in in Slovakia (85%) and in Hungary (68%) and self-employment is quite dominant in Poland (68%) and France (58%). Italy presents instead equal shares for these two forms (46% respectively). Although family-workers are only a minority, they constitute 22% in Poland.

One of the striking differences is related to the structure of agricultural holdings, which reflects diversities in geology, topography, climate, and endowment of natural resources (Eurostat, 2012). For instance, the economic size of farms across countries is quite heterogeneous, so that small farms (≤8 ESU) are the predominant structure in the NMS, and in particular subsistence farms represent a large share of total holdings with Hungary (86%), Poland (65%) and Slovakia (90%). Commercial holdings are instead more common in the EU-15, so that large farms represent the main structure for France (73%). Italy is to some extent a separate case, with 70% of small farms (35% subsistence and 35% semi-subsistence) and 30% of large ones. The overall production structure is mainly concentrated on crops, with the largest share occupied by Italy (80%), and variations in terms of livestock, and mixed

[5] Due to breaks in series and unavailability of some regional indicators one of the NUTS-2 regions in France was dropped from the sample, namely Corse. All the remaining regions were included in each country's respective samples, with the following: France (21 regions), Hungary (7 regions), Italy (21 regions), Poland (16 regions) and Slovakia (4 regions).

[6] The 2004 LFS for France did not contain information on the economic activity, employment status and region of residence of individuals one year prior to the survey and therefore it was dropped for the analysis.

[7] The summary statistics for the two sub-samples, i.e. those in agricultural employment and those leaving agriculture, are not included in the paper but are available upon request.

systems, these latter quite important for the NMS. In general, production and specialisation patterns matter for the different labour requirements, as some activities are more labour-intensive or require instead a seasonal demand for labour; their association with credit availability may also have an impact on the demand for labour.

2.4 Sequential Labour Decisions and Outcome Shares

The dependent variables can be envisaged in a nesting structure where three sequential probits constitute the three branches of the decision three, respectively: a) work in agriculture or in other sectors; b) leave the agricultural sector or stay; c) flow to industry/services or to non-employment (Figure 2).

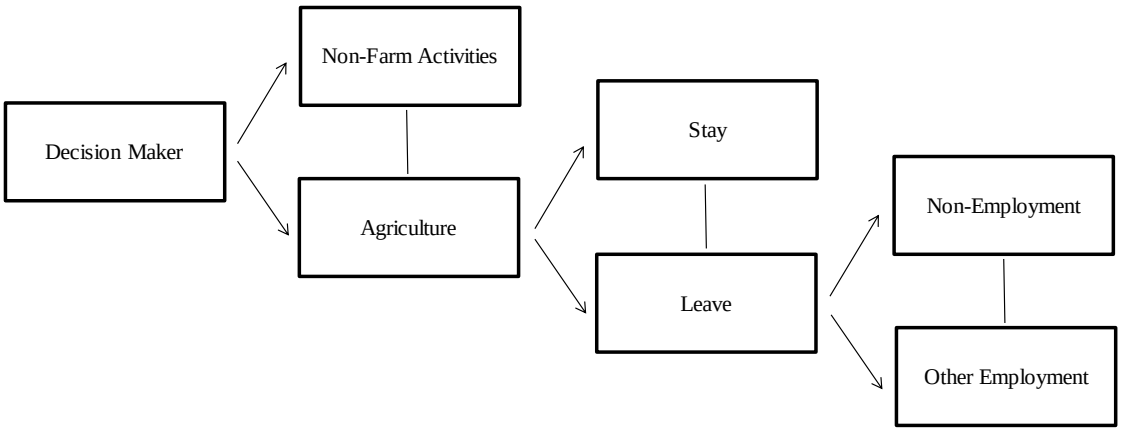

Figure 2. Decision tree of the labour outcomes.

The sample frequencies of different labour outcomes and their share in each sub-sample are summarised in Table 1. Although the large majority of agricultural workers (more than 85%) have remained in the farm sector in the following period, the highest exit rates are recorded for France, Italy and Hungary[8]. Moreover, most of the labour outflows are associated with non-employment, so that sectoral switch reaches significant figures only in Italy, followed by Poland and Hungary.

[8] However, the total number of people leaving agriculture in France is generally quite low, reflecting the low share of agricultural employment in comparison to other countries.

Table 1

Sample frequencies and shares of labour outcomes

Country	Total employment		Agricultural employment		Exit agriculture	
	Non-farm	Agriculture	Stay	Leave	Non-employment	Other employment
France	47,188	1,587	1,389	198	102	96
	(96.7)	(3.3)	(87.5)	(12.5)	(51.5)	(48.5)
Hungary	225,651	15,099	13,394	1,705	997	708
	(93.7)	(6.3)	(88.7)	(11.3)	(58.5)	(41.5)
Italy	499,394	24,536	21,585	2,951	1,653	1,298
	(95.3)	(4.7)	(88.0)	(12.0)	(56.0)	(44.0)
Poland	124,492	27,150	25,622	1,528	812	716
	(82.1)	(17.9)	(94.4)	(5.6)	(53.1)	(46.9)
Slovakia	92,486	4,565	4,149	416	275	141
	(95.3)	(4.7)	(90.9)	(9.1)	(66.1)	(33.9)

Note: Numbers in brackets indicate shares of each sub-sample.
Source: EU-LFS.

3. Empirical Methodology

One of the issues in estimating the exit decisions of agricultural workers is that these individuals might not be a random sample from the total population. Some unobserved characteristics which may affect the probability of agricultural employment in the first place would imply that these workers constitute a self-selected sample, and thus their occupational decisions may be different from those of the excluded sample (Heckman, 1979), i.e. people in non-farm activities. In that case, the errors in the decision functions to work in agriculture and leave the sector (and successively switch sector) will be correlated. The dependence of such decisions may introduce a bias and thus need to be controlled for when analysing the determinants of labour adjustments (Vella, 1998).

Therefore, the empirical methodology consists in employing a multivariate probit approach with two selection and one outcome equations. The first equation controls for selection into employment in agriculture, whereas the second, including only agricultural workers, for the selection into leaving the sector. Lastly, the outcome equation considers those workers who were previously employed in agriculture and have left the sector, and

examines the probability of a sectoral switch to other non-farm sectors. This 3-step approach, which is an extension of the bivariate probit with selection (van De Ven and van Praag, 1981), is estimated in a sequential mode, i.e. by constructing inverse Mill's ratio after each selection equation and including its value as regressor in the next equation at each stage. This procedure allows to obtain consistent estimates and to correct for sample selectivity.

The system of observed binary outcomes has the following form:

$$y_j^{agriempl} = (x_j\beta + u_{1j} > 0) \quad \text{selection into agricultural employment} \quad (1)$$

$$y_j^{leave} = (w_j\Upsilon + u_{2j} > 0) \quad \text{selection into leaving agriculture} \quad (2)$$

$$y_j^{otherempl} = (z_j\delta + u_{3j} > 0) \quad \text{outcome for switching occupational sector} \quad (3)$$

where $y_j^{leave} > 0$ if $y_j^{agriempl} = 1$ and missing otherwise; and $y_j^{otherempl} > 0$ if $y_j^{leave} = 1$ (and thus $y_j^{agriempl} = 1$) and missing otherwise. The inverse Mill's ratio, denoted by lambda, is computed as follows:

$$\lambda_j(\cdot) = \frac{\varphi(\cdot)}{\Phi(\cdot)} \quad (4)$$

where φ and Φ are respectively the probability density (pdf) and the cumulative distribution (CDF) functions of the standard normal distribution. The hypothesis of independence of the errors can be tested directly by checking the statistical significance of lambda (in equation 2 and 3), so that a significant inverse Mill's ratio is an indicator of selection bias (Cameron and Trivedi, 2010). For robust identification and to reduce collinearity we need to impose some exclusion restrictions in the selection equations, which can be justified on economic grounds[9].

4. Discussion of Results

The empirical methodology allows us to study two related but separate questions: first, "what are the determinants of leaving agriculture", and second, upon leaving agriculture "what

[9] The choice of the exclusion restrictions for the two selection equations and their validity are discussed in the next section.

determines the probability of employment in another sector of the economy, or for retirement and/or unemployment". Since we are interested in the differences across countries the results are classified according to the different research questions, i.e. agricultural employment (Table 2), leaving agriculture (Table 3), and switching occupational sector (Table 4).

The statistical significance of lambda provides support for the selection approach implying that independent estimations of each step would yield biased results[10]. The estimated coefficients are generally significant in all specifications, although with variations across countries, and in most of the cases they are consistent with our theoretical predictions. We can now proceed with the discussion of the results[11].

4.1 Determinants of Agricultural Employment

Overall males have a higher likelihood of agricultural employment. The age dummies suggest that younger individuals, in between 15-24 and 25-34 years, have a higher probability of working in non-farm sectors, whereas older individuals, in between 45-54 and mainly 55-64 years, have a higher likelihood of agricultural employment, consistent with the descriptive statistics which often emphasise a demographic ageing workforce of the farm sector[12]. An exception is France, for which instead the younger age group (15-24 years) is associated with a positive sign. The unambiguous sign of the education dummies support the notion that lower levels of educational attainment are associated with a higher likelihood of agricultural employment, whereas higher education has a strong negative effect. This is also in line with the evidence of unskilled labour, with low levels of formal education or training, in the farm-economy. The dummies for the specific field of received education, used as exclusion restrictions to identify the first selection equation, are assumed to have a substantial impact on the probability of agricultural employment. As expected, agriculture and veterinary specific education is associated with a highly statistically significant positive probability of being employed in agriculture; conversely, all other fields of education are associated with a negative probability. In particular, across all countries it seems that the largest coefficients for

[10] The only exception concerns the second selection model, where in the outcome equation (probability of switching occupational sector) the Mill's ratio (lambda2) for France and Slovakia is not statistically significant, which is most likely due to the restrictions used in the second step. See section 5.3 for a more detailed discussion.

[11] Due to the large number of specifications and countries the discussion is mainly focused on the significant variables and on the differences across countries.

[12] As identified by the European Agricultural Council, the demographic ageing of the farming population, common to southern Mediterranean countries, poses a big challenge for the future of rural employment as it alters the composition of the labour force, reduces future labour supply and puts a strain on public finances, hence constraining the development of the rural economy (European Commission, 2006).

non-farm employment are health and welfare, humanities languages and arts, and teacher training and education science.

The marital status of individuals, when significant, shows ambiguous results; for instance, in Italy being married would increase the probability of agricultural employment, whereas in Poland it would decrease it. In general, the presence of children under fifteen would seem to reduce the probability of agricultural employment (increase it for Slovakia), whereas in the case of females the effect is the opposite. This would reflect the fact that agriculture can accommodate better women part-time needs and allow them to look after the family and household related tasks.

The importance of job attributes is confirmed by the dummies for the type of worker: self-employed individuals and especially family-workers are more likely to be engaged in agriculture than employees[13]. As it has been suggested in the literature, there may be preferences for working in agriculture due to important non-pecuniary benefits (Van Herck, 2009), which include the autonomy of self-employment (Bojnec and Dries, 2005) as well as independence, sense of responsibility and pride associated with ownership (Key, 2005; Key and Roberts, 2009). Nonetheless, the high incidence of self-employment and informality in rural areas often prevent the capacity to take up other employment opportunities (ILO, 2008), implying that these working statuses may provide a shelter for those less mobile. The proxy for regional part-time work suggests that the lower the share of full-time agricultural labour in a region the higher the likelihood of individuals to be employed in agriculture. Although we would expect that more hours of farm work would be associated with a higher probability of agricultural employment (Bojnec and Dries, 2005), this result could be explained by the fact that part-time agricultural workers may be engaged in other diversification activities or secondary jobs, from which extra income provides a survival strategy for the farm business (Kimhi, 2000; Breustedt and Glauben, 2007).

[13] The non-significant coefficient for family worker in Slovakia possibly reflects the fact that the share of family workers in the country is already quite low, with only 60 individuals in this category, and only 3 of these appear to be in agricultural employment.

Table 2

Determinants of agricultural employment

Variable	France	Hungary	Italy	Poland	Slovakia
male	0.102**	0.425***	-0.003	0.026	0.368***
	(2.55)	(32.30)	(-0.38)	(1.53)	(15.94)
married	0.002	0.008	0.026***	-0.133***	-0.015
	(0.07)	(0.68)	(2.94)	(-8.41)	(-0.74)
age15_24	0.181***	-0.268***	-0.053***	-0.027	-0.480***
	(2.79)	(-11.24)	(-2.92)	(-0.95)	(-11.51)
age25_34	0.068	-0.206***	-0.086***	-0.056***	-0.405***
	(1.43)	(-14.43)	(-7.87)	(-3.21)	(-16.03)
age35_44	0.063	-0.063***	-0.039***	-0.041***	-0.181***
	(1.50)	(-4.96)	(-4.36)	(-2.63)	(-8.50)
age55_64	-0.020	0.054***	0.070***	0.048**	0.035
	(-0.45)	(3.83)	(6.84)	(2.52)	(1.49)
educlow	0.443***	0.332	0.408***	0.528***	0.522***
	(10.30)	(1.07)	(24.86)	(4.31)	(2.66)
educhigh	-0.325***	-0.350***	-0.488***	-0.811***	-0.353***
	(-6.94)	(-18.37)	(-27.67)	(-32.91)	(-11.70)
general	0.168	-0.237	-0.244***	-0.857***	-0.300
	(0.92)	(-0.76)	(-8.80)	(-6.90)	(-1.50)
teachertraining_educationscience	0.171	-0.713**	-0.370***	-0.673***	-0.982***
	(0.63)	(-2.26)	(-11.43)	(-4.94)	(-4.34)
human_lang_arts	-0.159*	-0.797**	-0.196***	-1.110***	-0.755***
	(-1.65)	(-2.48)	(-6.70)	(-7.60)	(-3.07)
socialsciences_business_law	0.051	-0.302	-0.212***	-0.697***	-0.191
	(0.93)	(-0.97)	(-10.98)	(-5.63)	(-0.97)
science_maths_comp	0.029	-0.499	-0.165***	-0.580***	-0.409*
	(0.33)	(-1.58)	(-5.86)	(-4.52)	(-1.91)
engineer_manufactur_construction		-0.236	-0.142***	-0.417***	-0.217
		(-0.76)	(-7.39)	(-3.41)	(-1.11)
agriculture_veterinary	1.794***	0.951***	1.100***	0.586***	0.982***
	(34.90)	(3.05)	(48.31)	(4.77)	(5.03)
health_welfare	-0.455***	-0.795**	-0.388***	-1.371***	-1.136***
	(-4.39)	(-2.53)	(-9.76)	(-10.26)	(-4.89)
services	-0.146	-0.531*	-0.236***	-0.432***	-0.380*
	(-1.46)	(-1.70)	(-7.43)	(-3.52)	(-1.92)
children	-0.143***	-0.032**	-0.034***	-0.007	0.047**
	(-3.42)	(-2.54)	(-3.53)	(-0.44)	(2.19)

(continued on next page)

Table 2 (Continued)

Variable	France	Hungary	Italy	Poland	Slovakia
fem_child	0.103	0.063***	0.095***	0.265***	-0.019
	(1.62)	(2.94)	(6.52)	(11.25)	(-0.53)
selfempl	1.296***	0.704***	0.573***	2.091***	0.108***
	(39.27)	(60.59)	(81.26)	(168.49)	(4.79)
familywork	1.874***	1.548***	1.083***	3.036***	0.363
	(21.59)	(36.47)	(68.53)	(124.42)	(1.27)
popdens	0.001*	-0.001	-0.000***	-0.002***	0.005
	(1.94)	(-1.36)	(-8.85)	(-9.66)	(0.58)
unemp	-0.020*	0.027***	0.024***	-0.015***	0.034
	(-1.65)	(4.31)	(17.60)	(-4.39)	(0.65)
wage_dif	-0.030**	-0.212***	-0.016***	0.028***	-0.268
	(-2.33)	(-3.59)	(-5.90)	(10.21)	(-0.82)
lab_dif	-0.007***	-0.005*	-0.005***	-0.009**	-0.016
	(-4.72)	(-1.83)	(-10.39)	(-2.44)	(-0.56)
subsfarm	0.571	1.556	-0.585***	-0.589***	-5.294
	(0.62)	(1.12)	(-7.63)	(-2.76)	(-0.19)
largefarm	2.605***	10.995**	0.247***	-0.192	-11.506
	(2.80)	(2.52)	(2.83)	(-0.76)	(-0.19)
agrireg	-1.091*	0.914***	0.188***	2.008***	-0.301
	(-1.74)	(4.38)	(5.87)	(8.00)	(-0.37)
FTagrilab	-1.155**	-0.011	-1.119***	-1.784***	-13.299
	(-2.08)	(-0.01)	(-10.49)	(-3.64)	(-0.71)
livestock	0.474***	1.690***	0.478***	0.616***	-0.423
	(3.07)	(8.71)	(10.13)	(4.64)	(-0.13)
mixcrliv	-1.764***	1.318**	0.741***	-0.072	0.094
	(-4.42)	(2.45)	(2.97)	(-0.25)	(0.03)
yr2005_6		-0.077*	0.007	-0.190***	-0.175
		(-1.71)	(0.60)	(-3.07)	(-1.13)
yr2007_8	-0.064*	-0.202***	0.009	-0.405***	
	(-1.96)	(-2.79)	(0.64)	(-5.98)	
_cons	-2.500***	-4.575***	-1.861***	-2.231***	4.131
	(-5.38)	(-3.02)	(-32.38)	(-5.87)	(0.14)
Number of observations	48,775	240,750	523,930	151,642	97,051

Notes: T-statistics in parentheses. Levels of significance: ***1%; **5%; *10%.
For France engineer_manufactur_construction and yr2005_6 were missing from the sample and were thus used as reference categories. yr2007_8 was omitted for Slovakia because of collinearity.

Individuals living in regions with a higher population density, which proxies for higher growth and thus job opportunities, are assumed to be less likely to be engaged in agriculture, although the results are somewhat mixed and suggest that this intuition is supported in the case of Italy and Poland, and is the opposite for France. Similarly, we obtain opposing results for the unemployment level, so that regions with higher unemployment levels are positively associated with a higher probability of working in agriculture, as for Hungary and Italy, and in other cases with a lower probability, as for France and Poland. Moreover, the higher the regional wage ratio between non-farm to farm activities, the more likely employment in non-agriculture is expected to be. Although this result is consistent for all countries, the coefficient appears to be positive for Poland. On the other hand, regions with a higher labour ratio of employment in non-farm to farm activities are characterised by a lower probability of working in agriculture, suggesting faster growth and more employment opportunities outside agriculture. The proxy for agricultural abundant regions have the predicted sign, implying that these areas are characterised by higher farming activities and thus more agricultural employment, although France exhibits an opposite sign.

The average farm size of holdings at the regional level is supposed to capture different labour requirements as well as different enterprise organisation; in general regions with a higher share of large farms are associated with higher agricultural employment, whereas those regions with a higher share of subsistence-farms are instead characterised by lower agricultural employment. Lastly, the dummies for the farm production structure suggest that individuals living in regions with a high share of livestock, in comparison to crops, are more likely to be engaged in agriculture. This result is also confirmed when looking at mixed production structures of both crops and livestock (with an opposite result for France), so that in general regions with a large share of crops, over other forms of output, are generally associated with less agricultural employment, which could reflect the seasonal demand for labour in crop production.

4.2 Determinants of Leaving Agriculture

After examining the determinants for establishing the agricultural occupational match, we are now interested in the explanatory factors which contribute to dissolve this match, and thus the determinants for exiting agriculture. Since there are different reasons for leaving the farm sector, we wish to differentiate among those individuals who, on one hand, exit into unemployment or leave the labour force altogether, and for instance retire, from those who, on the other hand, change occupational sector. The covariates used in the analysis are the

same as before, with the exclusion of the specific fields of education, which are the identification variables for the first selection equation. These are assumed to have a nontrivial impact on the determination of the first occupational match, whereas they would matter less for the following decisions of leaving and changing sector. In interpreting the coefficients we must be cautious since we are hereby comparing those who remain in agriculture on one hand, with two merged categories on the other, those who leave the labour force and those who make a sectoral switch, which contain very different characteristics.

The gender variable is only statistically significant for Italy and seems to suggest that males are generally less likely to leave agriculture in respect to women. Age displays the non-linear function, so that the probability of leaving the sector decreases with age up until a certain point, i.e. the excluded category of those aged 45-54 years, after which this probability is even higher. Essentially, younger individuals are assumed to be more mobile (Bojnec, Dries and Swinnen, 2003) and responsive to economic stimulus and thus may leave the sector for other non-farm jobs or for becoming temporary unemployed (frictional unemployment). By the same token, individuals over 55 years old are generally more likely to leave the labour force altogether and retire; the large coefficient would confirm that this age-group is in fact the one associated with the main outflows from agriculture. The education variable is somewhat hard to interpret and may capture the two exit destinations, so that low educational levels are generally positively associated with leaving the farm sector, whereas higher levels would reduce the exits in the case of Slovakia, but increase it in regards to Italy.

Married individuals are usually less inclined to leave farming (with the exception of France) which is quite consistent with the notion that married individuals are usually less mobile in comparison to their single counterparts (Bojnec and Dries, 2005). Although we do not have information on the working status and sector of the spouse, this result could suggest that husband and wife may be engaged in the same farm-business or farm activities. Whereas the presence of children under 15 in the household is not significant, it appears to have a positive impact for the likelihood of females leaving the sector in the case of Slovakia, which is most likely associated with child-bearing and household related responsibilities that women have.

Job attributes are quite important for the decision to leave agricultural employment so that in comparison to employees, self-employed individuals and family-workers are less

likely to exit agriculture[14]. This supports the assumption that employees are the most flexible category of workers, responsive to the market wage and off-farm opportunities. Self-employed individuals, due to ownership motives are less reluctant to exit their business, whereas family-workers are usually tied by family responsibilities and/or may find provisional work and subsistence in the farm household, often contributing to what is known as 'surplus of labour' in agriculture. The share of part-time labour, when significant, has an ambiguous effect on the probability of leaving the farm sector, so that a larger share of full-time farm labour is associated, on one hand, with a lower likelihood of leaving the sector (for Italy) and, on the other, with a higher likelihood (for Hungary). This may reflect differences in preferences, organisational structures, as well as the presence of diversification activities, additional jobs or other sources of income.

The regional indicators are to a certain degree less significant in this specification, possibly implying that they are more important for establishing the occupational match rather than explaining why this matched is dissolved. For instance, a high population density reduces only marginally the likelihood of leaving agriculture in the case of Italy. Whereas in the previous specification a higher population density was associated with a lower likelihood of agricultural employment, here it could reflect the greater competition effect in these regions and thus the preference of remaining in current employment.

A high regional unemployment rate is instead positively associated with exits from the sector, which may reflect the temporary provisions of some farm activities and thus frictional unemployment as well as movements of people towards inactivity (including the discouraged unemployed). Neither the wage ratio nor the labour ratio is significant, which would reflect the fact that these variables exert a more significant impact on the decision to work in agriculture in the first place and to switch sector (see section 4.3). Since those exiting agriculture may either leave the labour force or change job, the non-significance of these regional indicators may instead capture opposing results. A surprising result is also that regions with higher shares of utilised agricultural area seem to be associated with higher exit rates.

[14] In France and Slovakia, the observations for family work in the agricultural sample (91 and 3 respectively) were 'predicting failure perfectly' and thus were automatically dropped and not used for the empirical estimations. Hence, although not reported in the output tables, all family-workers in these two countries did not leave agriculture in the following period.

Table 3

Determinants of leaving agriculture

Variable	France	Hungary	Italy	Poland	Slovakia
male	-0.182	-0.032	-0.399***	-0.021	-0.131
	(-1.47)	(-0.74)	(-13.79)	(-0.54)	(-1.62)
married	0.229**	-0.108***	-0.083***	-0.167***	-0.202***
	(2.07)	(-3.26)	(-2.75)	(-4.70)	(-2.79)
age15_24	0.628***	0.268***	0.257***	0.512***	0.193
	(3.06)	(3.74)	(4.40)	(8.85)	(1.18)
age25_34	0.342**	0.263***	0.076**	0.305***	0.454***
	(2.12)	(5.91)	(2.05)	(7.23)	(4.72)
age35_44	0.152	0.084**	-0.011	0.060	0.248***
	(1.05)	(2.04)	(-0.33)	(1.48)	(3.00)
age55_64	0.760***	0.482***	0.365***	0.677***	0.687***
	(5.63)	(11.90)	(11.23)	(17.70)	(8.81)
educlow	0.177*	0.288***	-0.017	0.015	0.305***
	(1.74)	(8.50)	(-0.52)	(0.41)	(3.87)
educhigh	-0.051	0.057	0.314***	-0.061	-0.314***
	(-0.33)	(1.01)	(4.98)	(-0.86)	(-2.41)
children	-0.205	-0.020	0.019	0.029	-0.047
	(-1.47)	(-0.50)	(0.55)	(0.78)	(-0.59)
fem_child	0.197	0.084	-0.051	0.017	0.368***
	(0.95)	(1.23)	(-1.06)	(0.32)	(2.94)
selfempl	-0.558***	-0.457***	-0.538***	-0.404***	-0.381***
	(-3.65)	(-10.12)	(-14.93)	(-4.61)	(-3.79)
familywork		-0.142	-0.515***	-0.206*	
		(-1.32)	(-7.45)	(-1.94)	
popdens	0.002	0.001	-0.000***	-0.000	-0.002
	(1.42)	(0.45)	(-2.11)	(-0.34)	(-0.08)
unemp	0.004	0.065***	0.008	0.025***	0.036
	(0.11)	(3.43)	(1.55)	(3.20)	(0.17)
wage_dif	-0.016	-0.204	-0.008	0.002	-0.771
	(-0.39)	(-1.12)	(-0.84)	(0.33)	(-0.58)
lab_dif	-0.007	-0.002	0.001	0.004	0.053
	(-1.38)	(-0.17)	(0.52)	(0.46)	(0.50)
subsfarm	-1.208	10.506**	-0.616**	-1.107**	-15.379
	(-0.40)	(2.40)	(-2.46)	(-2.26)	(-0.13)
largefarm	-1.143	19.224	-0.299	-1.687***	-4.044
	(-0.38)	(1.48)	(-0.95)	(-2.89)	(-0.02)

(continued on next page)

Table 3 (Continued)

Variable	France	Hungary	Italy	Poland	Slovakia
agrirreg	-0.178	1.935***	0.218**	0.688	-0.868
	(-0.09)	(2.99)	(1.97)	(1.12)	(-0.26)
FTagrilab	-0.324	13.351**	-1.061***	-0.731	32.310
	(-0.18)	(2.55)	(-2.71)	(-0.67)	(0.48)
livestock	-0.045	-1.376**	0.583***	-0.083	-3.143
	(-0.09)	(-2.38)	(3.34)	(-0.27)	(-0.23)
mixcrliv	0.661	3.107*	0.831	-0.656	15.626
	(0.52)	(1.79)	(0.95)	(-1.00)	(1.38)
yr2005_6		-0.017	0.152***	-0.039	-0.298
		(-0.12)	(3.49)	(-0.30)	(-0.52)
yr2007_8	0.240**	0.014	0.143***	0.155	
	(2.35)	(0.06)	(2.79)	(1.07)	
_cons	-0.567	-13.782***	-1.394***	-1.423*	9.165
	(-0.38)	(-2.97)	(-6.43)	(-1.65)	(0.08)
lambda	0.301***	0.304***	0.398***	0.235***	0.200***
	(3.28)	(6.71)	(7.63)	(4.55)	(2.91)
Number of observations	1,496	15,099	24,536	27,150	4,562

Notes: T-statistics in parentheses. Levels of significance: ***1%; **5%; *10%.
For France and Slovakia familywork predicts failure perfectly and was dropped. For France yr2005_6 was missing from the sample and was thus used as reference category. yr2007_8 was omitted for Slovakia because of collinearity.

The size of the farm at the regional level captures differences in the organisational structure of the business (or farm household) and thus different constraints or prospects for survival. As far as Hungary is concerned, regions with a large share of subsistence farms are associated with higher exit rates from agriculture, whereas in the case of Italy and Poland these regions have instead lower exits. Partly, this could reflect the different descriptive statistics, since in our sample 86% of the farms in Hungary are subsistence oriented, whereas in Poland and Italy they represent respectively 65% and 35%. At the same time, as emphasised in section 2, the on-going structural change and the sharp decline of agricultural holdings in Hungary could reflect the fact that subsistence farms are usually the first to disappear in the restructuring process. Conversely, subsistence farms in Italy and Poland may play a buffer role and instead prevent major outflows of labour.

The farm production structure is not quite significant across all countries, and shows ambiguous results: in Italy, regions with a larger share of livestock production, in comparison

to crops, are associated with larger exit rates from the sector, whereas the effect is the opposite in Hungary. From the empirical evidence we expected regions with higher livestock shares to be associated with lower outflows, due to the high sunk costs associated with quitting (Glauben, Tietje, and Weiss, 2003).

4.3 Determinants of Switching Occupational Sector

After controlling for selection into agricultural employment and for exiting agriculture we proceed with the estimation of the outcome equation, i.e. whether the individual engages in non-farm activities (sectoral switch) or flows to non-employment (out of the labour force or unemployment). As exclusion restrictions from the previous selection equation we use all farm-specific indicators at the regional level, namely the proxy for part-time agricultural labour, farm size and farm production variables. The reason for doing this is that farm-specific variables matter for the determination of agricultural employment and to some extent for the exiting decisions of agricultural workers, although they would not matter for the outcome of switching occupational sector.[15] In our results we do find that there is selection for Hungary, Italy and Poland at least at the 5% level of significance, although we find no statistical significance for France and Slovakia. We suspect that this result is because, for these two countries, none of the farm-specific indicators are found to be significant in explaining the probability of leaving agriculture.[16] Nonetheless, selection bias was detected for the other countries, implying that estimating independent models would have led to biased results.

Male agricultural workers who leave the sector are generally more likely to switch occupational sector rather than flow to non-employment, consistent with the fact that males are usually more active in the labour market and more mobile across sectors. The age variable displays the non-linear function found in the empirical literature, suggesting that individuals over 35 years old are generally more likely to engage in non-farm jobs, although this probability considerably diminishes after 54 years old. We expected the dummy for high level of education to be an important determinant for the probability of a sectoral switch, although it is not significant.

[15] One of issues with selection models is the capacity to find valid exclusion restrictions, so that even when we find no selection (no significance of the Mill's ratio in the outcome equation) it could be that the identification variables are not appropriate and thus there may still be a selection mechanism.

[16] This is possibly due to a low variation across regions, and therefore we may need better identification variables to capture the on-going selection characterising these two countries.

Table 4

Determinants of switching occupational sector

Variable	France	Hungary	Italy	Poland	Slovakia
male	-0.208	0.152	0.877***	0.567***	0.270
	(-0.68)	(1.52)	(6.01)	(4.79)	(1.06)
married	0.002	0.191**	0.077	0.463***	0.354
	(0.01)	(2.24)	(1.02)	(3.66)	(1.38)
age15_24	0.237	-0.138	-0.451***	-0.647***	0.212
	(0.41)	(-0.79)	(-2.96)	(-2.1)	(0.46)
age25_34	-1.049**	0.179	-0.122	-0.046	0.157
	(-2.51)	(1.34)	(-1.3)	(-0.22)	(0.31)
age35_44	-0.249	0.099	0.014	0.407***	0.173
	(-0.7)	(0.97)	(0.18)	(3.22)	(0.52)
age55_64	-1.403**	-1.322***	-1.113***	-2.913***	-1.400***
	(-2.4)	(-7.88)	(-8.37)	(-8.05)	(-2.42)
educlow	-0.349	-0.629***	-0.532***	-0.237**	-0.166
	(-1.43)	(-7.23)	(-6.56)	(-2.18)	(-0.63)
educhigh	-0.342	0.009	0.103	0.212	0.591
	(-0.98)	(0.07)	(0.55)	(1.16)	(1.17)
children	0.021	0.109	0.152*	0.006	0.423*
	(0.06)	(1.17)	(1.78)	(0.05)	(1.83)
fem_child	0.004	-0.828***	-0.347***	0.004	-0.808*
	(0.01)	(-5.07)	(-2.96)	(0.02)	(-1.84)
selfempl	-0.095	0.687***	0.674***	1.776***	-1.333***
	(-0.15)	(3.28)	(2.84)	(4.53)	(-2.69)
familywork		0.547*	0.791**	1.805***	
		(1.89)	(2.55)	(5.29)	
popdens	0.002	-0.001	0.000	0.004***	-0.016
	(0.81)	(-0.21)	(0.22)	(3.04)	(-0.74)
unemp	-0.137**	-0.094***	-0.067***	-0.019	-0.147
	(-2.06)	(-5.13)	(-5.98)	(-0.76)	(-1.46)
wage_dif	0.019	0.502*	0.051**	-0.019	1.332**
	(0.27)	(1.8)	(2.18)	(-1.39)	(2.11)
lab_dif	-0.005	-0.010	0.008**	-0.075***	0.030
	(-0.51)	(-0.74)	(2.27)	(-3.11)	(0.55)
agrireg	-0.226	-1.320**	0.086	-1.071	0.318
	(-0.1)	(-1.98)	(0.37)	(-0.82)	(0.51)

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Table 4 (Continued)

Variable	France	Hungary	Italy	Poland	Slovakia
yr2005_6		-0.179	0.388***	0.022	0.101
		(-1.29)	(3.15)	(0.1)	(0.14)
yr2007_8	-0.271	-0.286*	0.133	0.620*	-0.515
	(-1.04)	(-1.94)	(1.01)	(1.89)	(-0.47)
_cons	1.702	2.934***	1.101**	3.715*	0.674
	(0.70)	(3.40)	(1.99)	(1.91)	(0.30)
lambda2	0.394	-1.061***	-0.892**	-2.122***	0.120
	(0.48)	(-3.06)	(-2.32)	(-3.6)	(0.13)
Number of observations	198	1,705	2,951	1,528	416

Notes: T-statistics in parentheses. Levels of significance: ***1%; **5%; *10%.
For France and Slovakia familywork was dropped in the previous estimation (see notes in Table 3). For France yr2005_6 was missing from the sample and was thus used as reference category.

This could be due to the fact that there are only few individuals with higher levels of education in the agricultural sample and these may hold supervisory or managerial positions and thus their incentives to find alternative employment may be quite low. Conversely, low levels of education significantly reduce the probability of finding other sectoral employment. Being married and having children increases the likelihood of switching sector, possibly due to the extra income needed for the family household and, consistent with the literature, this effect is the opposite for women, due to their responsibility for family care and household related tasks.

In terms of job-related attributes it seems that family-workers and self-employed, after exiting agriculture, are more likely to be employed in non-farm jobs than employees. These results appear to be counter-intuitive at first, since we expected employees to be the more responsive to labour market conditions and better job opportunities. Nonetheless, we need to bear in mind that we already controlled for family workers and self-employed in the previous specifications, and the results suggested that these group of workers are more likely to be employed in agriculture in the first place, and less likely to leave agriculture in general. Therefore, family-workers and self-employed individuals may simply face a higher cost of leaving current employment so that they exit agriculture when the sectoral switch is somehow secured, whereas employees, although more mobile in general, may become temporarily unemployed or may leave the labour force altogether.

Lastly, regional indicators suggest that both a high population density and more importantly a low unemployment level increase the probability of finding non-farm employment. Moreover, a high differential between non-farm to farm wage also increases the likelihood of a sectoral switch, consistent with the fact that individuals respond to market incentives and labour market conditions in the region (Barkley, 1990; Gullstrand and Tezic, 2008). The labour ratio of non-farm to farm employment, which would capture the absorption capacity of the non-farm economy and thus relative growth (Larson and Mundlak, 1997; Olper et al., 2012), has the expected positive sign for Italy, whereas it is negative for Poland, which could be instead due to a large labour turnover and higher competition which would see agricultural workers to flow into frictional unemployment. Finally, individuals living in more agricultural abundant regions after exiting agriculture are less likely to switch occupational sector.

5. Conclusions

The study has explored the determinants to leave agricultural employment and change occupational sector by adopting a 3-step multivariate probit with selection. The significance of the Mill's ratio provides support for the empirical approach. First of all, this specification has allowed us to identify the best bundle of characteristics to establish a first occupational match and work in agriculture. The results suggest that older individuals (over 45 years old and particularly over 55), with lower levels of formal education or training (except for those with specific agriculture or veterinary education), mainly self-employed but also family workers, as well as women with children, are all more likely to be engaged in farming. Moreover, this likelihood is higher in regions with a lower share of employment in the non-farm sector (relative to the farm sector), reflecting fewer job opportunities outside agriculture, and with a larger share of utilised agricultural area. In terms of farm characteristics, regions with large farms and livestock production are generally characterised by higher agricultural employment.

Secondly, we have examined the determinants of leaving agricultural employment and thus switching occupational sector. The main results suggest that younger individuals are more likely to leave farming as they are more mobile and thus more inclined to find alternative employment or to flow to frictional unemployment. Nonetheless, the largest outflows from agriculture are associated with the retirement of people. Moreover, people with low levels of educations are found to be constrained in the non-farm labour market, so that

although they seem to be more likely to exit agriculture overall, they do not seem to possess those transferrable skills necessary to move across activities.

Whereas self-employed and family workers are generally less likely to leave agriculture in comparison to employees, which can be explained in terms of pride, autonomy and sense of responsibility associated with farming, when they do exit, they appear to be more inclined in switching occupational sector, rather than leaving the labour force, possibly due to the higher costs associated with leaving altogether. Lastly, higher population density, lower unemployment, higher non-farm wages and higher employment in the non-farm sector represent important pull-factors for attracting agricultural labour into the non-farm economy, so that labour market conditions at the regional level do matter for switching occupational sector.

Thirdly, the mixture of case studies has emphasised the existence of heterogeneous farm sectors, with different organisational and production structures, especially between NMS and EU-15. Farm characteristics are found to have different impacts on explaining outflows of labour. In Hungary, regions with a large share of subsistence farms are associated with higher farm exit rates, suggesting that these farms are the first to disappear in the process of structural change. Conversely, in Italy and Poland, regions with a predominance of subsistence farms have experienced lower exit rates. The main differences in the results are reflected by the different production structures, suggesting different capacities to release and absorb labour.

The main policy implication from the present study would confirm the necessity to invest in human capital as inadequate levels of education and vocational training represent the most important supply-side constraints for an efficient allocation of labour. Improving factor mobility, and hence a smooth transition across activities, would imply a better functioning of labour markets, with important consequences for the income and the development of people in rural areas.

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Appendix

Table A.1
Definitions of variables

Variable	Definition	Symbol	Source
Gender	(1 = male; 0 = female)	male	EU-LFS
Age	Six dummies for different age bands	age15_24, age25_34, age35_44, age45_54, age55_64	EU-LFS
Education level	Three dummies (ISCED classification): low (lower secondary), medium (upper secondary), high (tertiary)	educlow, educmedium, educhigh	EU-LFS
Education field	Dummies for highest field of education or training successfully completed: a)general programmes; b)teacher training and education science; c)humanities, languages and arts, foreign languages; d) social sciences, business and law; e) sciences (life science and physical science), mathematics and statistics, computing (computer science and computer use); f) engineering, manufacturing and construction; g) agriculture and veterinary; h) health and welfare; i) services; j) other fields; k) only lower secondary	general, teachertraining_educationscience, human_lang_arts, socialsciences_business_law, sciences_math_comp, engineer_manufactur_construction, agriculture_veterinary, health_welfare, services, other, none	EU-LFS
Marital status	(1 = married; 0 = otherwise)	married	EU-LFS
Children	Presence of children <15 years	children	EU-LFS
Females with children	Interaction of female X children	fem_child	EU-LFS
Professional status	Three dummies: employee, self-employed, family worker	employee, selfempl, familywork	EU-LFS
Full-time agricultural labour	Share of total family labour force full-time employed in agriculture over total family labour force in agriculture (NUTS2 region)	Ftagrilab	FSS- Eurostat
Population density	Inhabitants per km2 (NUTS2 region)	popdens	Eurostat New Cronos
Unemployment	Unemployment rate (%) (NUTS2 region)	unemp	Eurostat New Cronos
Wage ratio	Average compensation per employee in non-agriculture relative to the average compensation per employee in agriculture (NUTS2 region)	wage_dif	Eurostat New Cronos
Labour ratio	Number of people employed in non-agriculture relative to the number in agriculture (NUTS2 region)	lab_dif	Eurostat New Cronos
Agricultural area	Utilised agricultural area (UUA) over total area (hectares) (NUTS2 region)	agrireg	FSS- Eurostat
Farm size	Three dummies for the economic size of farms (standard gross margin) as a share of total holdings (NUTS2 region): subsistence farms (<2 ESU), semi-subsistence farms (2-8 ESU), large farms (>8 ESU)	subsfarm, semisubsfarm, largefarm	FSS- Eurostat
Production structure	Three dummies for typology of farming system (based on standard gross margin) as a share of total holdings (NUTS2 region): crops, livestock, mixed crops and livestock	crops, livestock, mixcrliv	FSS- Eurostat
Years	Three dummies for years of analysis: 2003-04, 2005-06, 2007-08	yr2003_4, yr4005_6, yr2007_8	EU-LFS

Table A.2
Descriptive statistics of the total sample

	France (N = 48,775)		Hungary (N = 240,750)		Italy (N = 523,930)		Poland (N= 151,642)		Slovakia (N = 97,051)	
Variable	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Dep = agriempl	0.03	0.18	0.06	0.24	0.05	0.21	0.18	0.38	0.05	0.21
male	0.53	0.50	0.54	0.50	0.60	0.49	0.54	0.50	0.56	0.50
married	0.52	0.50	0.61	0.49	0.65	0.48	0.74	0.44	0.69	0.46
age15_24	0.07	0.25	0.06	0.24	0.05	0.22	0.07	0.26	0.07	0.26
age25_34	0.24	0.43	0.25	0.43	0.21	0.41	0.26	0.44	0.25	0.43
age35_44	0.28	0.45	0.26	0.44	0.32	0.47	0.27	0.44	0.27	0.44
age45_54	0.28	0.45	0.30	0.46	0.29	0.45	0.30	0.46	0.30	0.46
age55_64	0.13	0.34	0.13	0.33	0.13	0.34	0.10	0.30	0.11	0.32
educlow	0.26	0.44	0.15	0.36	0.40	0.49	0.11	0.31	0.05	0.21
educmedium	0.45	0.50	0.66	0.47	0.45	0.50	0.68	0.46	0.79	0.41
educhigh	0.30	0.46	0.18	0.39	0.15	0.36	0.21	0.40	0.16	0.37
general	0.01	0.09	0.08	0.27	0.04	0.19	0.07	0.26	0.04	0.20
teachertraining_educationscience	0.01	0.08	0.06	0.23	0.03	0.18	0.04	0.20	0.04	0.21
human_lang_arts	0.06	0.24	0.01	0.11	0.05	0.21	0.02	0.15	0.01	0.12
socialsciences_business_law	0.24	0.43	0.15	0.36	0.18	0.38	0.13	0.34	0.15	0.36
sciences_math_comp	0.06	0.23	0.02	0.12	0.04	0.19	0.04	0.19	0.02	0.13
engineer_manufactur_construction	0.22	0.42	0.39	0.49	0.15	0.35	0.35	0.48	0.49	0.50
agriculture_veterinary	0.03	0.17	0.04	0.19	0.02	0.13	0.08	0.27	0.06	0.24
health_welfare	0.07	0.26	0.05	0.21	0.03	0.18	0.04	0.19	0.05	0.21
services	0.04	0.19	0.06	0.24	0.03	0.16	0.11	0.31	0.08	0.28
other	0.00	0.00	0.00	0.01	0.05	0.22	0.00	0.04	0.00	0.04
none	0.26	0.44	0.15	0.36	0.40	0.49	0.11	0.31	0.05	0.21
children	0.40	0.49	0.33	0.47	0.38	0.49	0.45	0.50	0.36	0.48
fem_child	0.19	0.39	0.14	0.34	0.15	0.35	0.20	0.40	0.15	0.36
employee	0.90	0.30	0.88	0.32	0.75	0.43	0.74	0.44	0.88	0.32
selfempl	0.10	0.30	0.11	0.32	0.23	0.42	0.21	0.41	0.12	0.32
familywork	0.01	0.07	0.00	0.06	0.02	0.13	0.04	0.21	0.00	0.02
popdens	271.53	328.99	157.71	136.12	222.22	120.31	138.59	80.22	128.29	64.57
unemp	8.46	1.77	7.39	2.46	7.01	4.58	13.86	4.57	14.21	5.78
wage_dif	4.32	1.65	1.86	0.38	3.71	1.82	10.58	6.36	1.44	0.31
lab_dif	67.17	85.01	30.21	26.64	28.06	16.37	7.24	6.20	25.71	18.30
subsfarm	0.12	0.06	0.88	0.04	0.34	0.09	0.67	0.13	0.90	0.02
semisubsfarm	0.14	0.05	0.08	0.03	0.33	0.07	0.22	0.07	0.06	0.01
largefarm	0.74	0.09	0.04	0.01	0.33	0.12	0.12	0.08	0.05	0.01
agrireg	0.95	0.05	0.68	0.09	0.70	0.14	0.85	0.04	0.77	0.27
FTagrilab	0.43	0.07	0.04	0.02	0.20	0.12	0.15	0.06	0.03	0.01
crops	0.55	0.26	0.42	0.05	0.77	0.15	0.46	0.08	0.54	0.18
livestock	0.34	0.24	0.41	0.07	0.18	0.14	0.33	0.09	0.26	0.13
mixcrliv	0.11	0.06	0.16	0.02	0.05	0.02	0.20	0.03	0.20	0.06
yr2003_4			0.12	0.33	0.11	0.32	0.02	0.14	0.11	0.31
yr2005_6	0.44	0.50	0.46	0.50	0.45	0.50	0.48	0.50	0.44	0.50
yr2007_8	0.56	0.50	0.42	0.49	0.44	0.50	0.50	0.50	0.45	0.50