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Agricultural adjustment and the diversification of farm households and corporate farms in Central Europe

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Abstract

Survey evidence from three Central European Countries (Czech Republic, Hungary and Poland) is analysed to identify the degree of non-agricultural farm diversification and the factors facilitating or impeding it in individual and corporate farms. The effect of diversification on rural job creation and household incomes is investigated. The results indicate that the level of diversification is relatively small and enterprise diversification by farmers is unlikely to generate sufficient new jobs to solve the problem of high rural unemployment. The attempt to transpose the West European model of agricultural diversification to the associated countries via the SAPARD programme is questionable, as non-farm centric rural policies appear to be more appropriate.

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1. Introduction

Since the 1980s, direct national and supra-national government support for agricultural diversification has become an explicit policy in the EU. For example, financial support for agricultural diversification and agri-tourism has been included in support measures for rural development from the European Agricultural Guidance and Guarantee Fund (EAGGF), with the aim of improving economic opportunities and accessibility in disadvantaged rural regions. Support programmes have been tailored to the structure of farming in the EU and to ease the realignment to a more market-oriented agricultural policy. An attempt has been made to transpose this West European model of agricultural diversification to the associated countries of Central and Eastern Europe as an option for funding under the EU's Special Accession Programme for Agriculture and Rural Development (SAPARD). This paper investigates the current nature of, and factors affecting, non-agricultural farm diversification in three Central European states (Czech Republic, Hungary and Poland) by studying both individual and corporate farms and attempts to assess the appropriateness of the transfer of the West European model.

The objective of this paper is to identify key factors facilitating or impeding non-agricultural farm diversification in three Central European countries. The profitability of agriculture in Central Europe is overall much lower than in existing member states (Pouliquen, 2001) with particularly poor returns to small-scale agriculture. In addition, rural areas in the region are typically characterised by a paucity of alternative employment opportunities and weak non-farm rural economies (Davis, 2001). Post-accession, the farms in these countries are expected to achieve an increase in productivity with a net decline in agricultural employment. Agricultural diversification may play a key role in absorbing some of the excess farm labour and contribute to developing alternative income opportunities. Against this background, the paper attempts to, first, accurately document the current level of non-agricultural diversification in Central Europe in a manner that accounts for the specific historic evolution of farm structures and engagement in agriculture; second, identify the factors influencing the decision to diversify, and third, critically analyse the feasibility of transposing existing West European models of agrarian adjustment to the CEECs. In doing so, important differences, between agrarian actors, involvement in agriculture and the history of diversification, that exist between the EU member states and the accession countries are taken into consideration.

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The paper is divided into five sections. The next section reviews the main tenets of the West European model of agricultural diversification and how its assumptions differ from agrarian structures and problems in the three acceding countries. The methodology and data employed in the study are described in Section 3 and the analysis of data reported in Section 4. In the conclusion, the appropriateness of the transposition of current Western European policy on agricultural diversification to the Central and Eastern European countries (CEECs) is questioned.

2. Western European model of agricultural diversification and its transposition to the associated countries of Central and Eastern Europe

Policies to support agricultural diversification in the EU have been based on a distinctive conceptualisation of two key pressures facing agriculture, which are altering the sector's role within the wider rural economy. In this model, the first main pressure is that of capitalist production relations under which farming faces a 'treadmill' of technological change. The latter has increased production but worsened the sector's terms of trade. Likewise, technical change and capitalisation have encouraged farm amalgamation and lowered the demand for labour in agriculture. In this productionist framework, the number of farms, size of the workforce and returns to agricultural activities will inevitably decrease as farming is playing an increasingly subordinate role within highly complex agri-food chains (Whatmore et al., 1990). To deal with decreasing demand for agricultural labour and the marginalisation of small-scale farming, an adjustment strategy is required to develop alternative sources of income.

The second set of pressures facing the agricultural sector in Europe derives from policy reform. Successive reforms of the Common Agricultural Policy (CAP) have attempted to reduce the level of real protection afforded to farmers in the EU and have altered the instruments of support. These reforms, which aim to increase international competitiveness in the Union, are seen to promote further farm amalgamation and reductions in the agricultural labour force. To ease policy adjustment, direct payments were introduced along with increased financial support for rural development that may concern 'the diversification of activities with the aim of complementary or alternative activities' (Council of the EU, 1999). The result of these political-economic pressures is that the space taken up by agriculture is now in stark contrast to the employment opportunities it offers with the implication that agriculture will not provide nearly enough jobs for the rural work-force and that diversification of the economic base is essential.

Within this particular policy environment, strategies to aid agricultural diversification have been developed which rest on five main assumptions. These five assumptions can be listed as: (a) the unit for policy intervention is the farm household; (b) diversification is a process of decreasing dependence on agricultural activities; (c) real protection to farmers is being reduced; (d) farm households possess a relatively high level of physical assets and (e) farm diversification can make a significant contribution to rural development. These assumptions are discussed in turn and contrasted with conditions in the three candidate countries.

2.1. *The unit for policy intervention is the farm household*

EU agricultural policy has been tailored to, and reinforced the predominance of, family farms (Christiaensen and Swinnen, 1994). Similarly, studies of agricultural diversification have typically taken the farm household as a unit of analysis, for example, in the cross-national Arkleton Trust project that investigated pluriactivity in 12 West European states (Fuller, 1990) and Gasson's work on the interaction between familial relations and agrarian markets (Gasson, 1986, 1988). Many of the associated countries, however, have a more diverse set of actors engaged in agriculture than that present in the current member states. During the communist era, Hungary and the former Czechoslovakia were characterised by a bi-modal farm structure comprised of large collective and state farms, supplemented by small household plots (Harcza et al., 1998). The average size of the collectivised farms was between 2000 and 3000 hectares (ha), which far exceeds the size of the typical family farm in the current EU member states. At the other end of the spectrum, household plots were normally between 0.5 and 2 ha in size and produced mainly for self-consumption. Poland, unlike most CEECs, was not extensively collectivised in the communist period, but was characterised by a mass of small but full-time peasant farms of approximately 5–15 ha (Munroe, 2001).

While land reform procedures and patterns of farm restructuring have been complex, in Hungary and the Czech Republic significant numbers of transformed former collective farms still exist and can be labelled corporate farms. Although corporate farms utilise a much smaller proportion of the total land area than the former collective farms, farms operating on 500–3000 ha and employing in excess of 50–100 employees are not uncommon (Csaki and Lerman, 1998). During transition, new individual farms have been created through the restitution of land, the disintegration of many former collective farms and the expansion of some household plots. In Poland, while rapid structural change was expected at the outset of transition, the large mass of small peasant farms has remained. For

example, returns from the 2000 Polish Agricultural Census identified more than a million agricultural holdings of between 1 and 5 ha in size (GUS, 2001).

Given this diverse pattern of agrarian structures, it is important that studies of diversification in the CEECs do not analyse the issue solely through the farm household model, which has prevailed in research on the current member states. Rather for the CEECs two distinct types of farm structures should be investigated, individual farms (the household sector) and corporate farms.

2.2. Diversification is a process of decreasing dependence on agriculture

West European studies of agricultural diversification have assumed that adjustment occurs as the household steadily decreases its dependence on agriculture. The conceptual starting point in these studies is, therefore, households that are fully engaged in agrarian activities. This is an inappropriate supposition for the CEECs. During the communist era, collective farms were encouraged to develop non-agricultural activities (Held, 1980). As the returns from non-agricultural enterprises were typically significantly greater than for the tightly regulated agricultural production, diversification into food processing, light manufacturing and tertiary industries was common.

During the land reform process and the restructuring of collective farms, the most lucrative parts of the collectives were often cherry picked by senior managers and converted into a separate legal entity, leaving the residual enterprise with the unprofitable (mainly agricultural) activities and any inherited debts (Swain, 1999). Overall, the process of transforming the collective farms into successor corporate farms often had the effect of making them more 'agricultural'. Land reform legislation in both the Czech Republic and Hungary enabled the restitution of land back to pre-collectivisation owners or their heirs (Swain, 2000). Some of the recipients of land chose to farm it themselves, while others decided to lease their land to corporate actors. While absolute figures are difficult to estimate, the land reform process undoubtedly increased the numbers engaged in agriculture either as operators or owners. This historical pattern is very different to the West European experience of a steady post-war disengagement from agriculture.

2.3. Farmers have a considerable asset base

While the numbers engaged in agriculture has declined significantly in the post-war period in the EU, it has been typically assumed that family farms have a considerable asset base from which they can embark on diversification. For example, several schemes have

attempted to promote the conversion of farm physical assets into new uses (renewal of redundant buildings and development of farm tourism) or the conversion of land into sporting and leisure uses (Ilbery et al., 1998). In the associated states, individual farms have typically less physical, financial and landed capital than their EU counterparts and often the only item they own is a parcel of land. Some evidence on capitalisation was given by a recent study of book-keeping farms in Western and Eastern Europe (Davidova et al., 2002). They found that the average value of total assets employed in agriculture per hectare in the Czech Republic, Hungary and Poland in 1999 was 1450, 1977 and 3440 euros, respectively. In contrast, for the two EU regions studied (the small-scale, upland farming region of Navarra in Spain and the lowland, arable region of south-east England) the comparative figures were 5840 and 9540 euros, respectively (Davidova et al., 2002).

2.4. CAP reform

The promotion of agricultural diversification in the EU has been against a backdrop of CAP reform that is lessening the real protection afforded to agriculture (Shucksmith and Winter, 1990). CEEC agriculture has a very different history of relationships with the state and overall, during the 1990s, received significantly less market price and direct payment support than in the EU (OECD, 2001). Post-accession, in general, the level of price support and direct payments are expected to be higher than that which CEEC farmers currently receive.¹ Whereas diversification is promoted in Western Europe as a strategy for dealing with falling government protection, for the CEECs it is necessary to consider the attractiveness of diversification in an environment of rising support and its compatibility with the adoption of the CAP.

2.5. Agricultural diversification can make a significant contribution to rural development

In Western Europe, by creating new non-agricultural enterprises and consequent job generation, diversification has been seen by some as a plausible strategy for rural development. However, the rate of agricultural diversification has been spatially uneven (McInerney and Turner, 1991). The highest levels of diversification and new job generation have been recorded in accessible and wealthier rural areas. This diversification has tapped into a growing demand for leisure and recreational activities. In contrast, where diversification is most needed, in remote low-income localities, performance has been extremely modest. Stimulating economic

¹ Slovenia is an exception to this, as in this case support to farmers is expected to decrease as a result of accession.

development in the rural areas of the CEECs represents a serious challenge, as income levels are significantly lower than in the existing member states.

From this section, it can be concluded that important differences exist between the EU member states and the associated countries. There is therefore a requirement to assess to what extent strategies implemented in the current EU could be effective in Central Europe and the degree to which new solutions are required.

3. Methodology

3.1. Working definitions

In this paper, agricultural diversification is defined as the generation of other gainful activities (OGAs) by farmers outside of the primary production of food or fibre (derived from Slee, 1987). Diversification thus includes four potential sources of income: *non-agricultural on- and off-farm enterprises, non-agricultural employment and unearned income*.² It is possible, therefore, to distinguish between *income diversification* and *enterprise diversification*. The former will include any shift of emphasis by the farm household from core agricultural activities towards *on-farm-diversified enterprises, off-farm enterprises, non-agricultural employment and unearned income* so that they form a greater proportion of total farm income. Income diversification is a wider notion and could occur on the basis of waged labour or entrepreneurship. *Enterprise diversification*, on the other hand, only includes a movement towards the establishment of new businesses either on- or off-farm and it is only one of the potential forms of income diversification.

This simplification of the diversity of potential sources of incomes or activities undertaken is used for analytical purposes notwithstanding the variety of notions that have been used in the literature to address diversification, such as on-farm/off farm, activity based/income based, wage income/enterprise income, full-time/part-time and mono-/pluriactive (Evans and Ilbery, 1993). While the classification of potential forms of diversification and the unit of analysis have stimulated many debates (Gasson, 1988), which are not reviewed in detail here, two different units of analysis are employed in the paper, individual farms (the household sector) and corporate farms, and different issues are investigated for each. For the individual farms, all potential sources of income diversification (which includes both employment and enterprise diversification) are investigated

² *Unearned income* does not require the receiver to devote human resources in order for it to be obtained. Examples are pensions and other state benefits, interest from savings, dividends, remittances (Shucksmith et al., 1989).

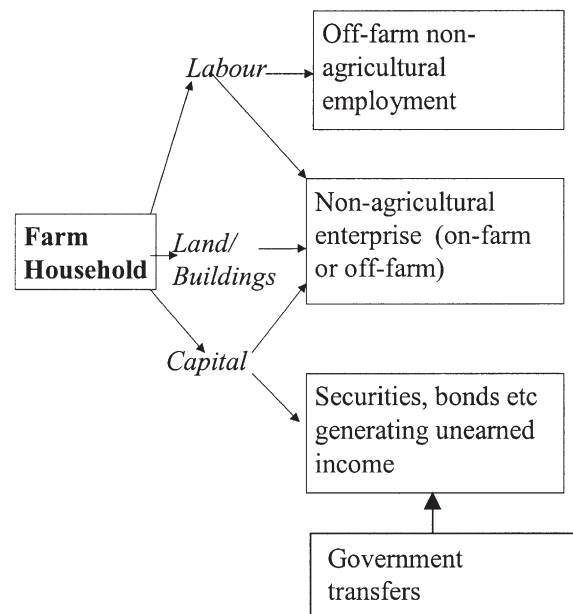


Fig. 1. Diversification in the individual farm case.

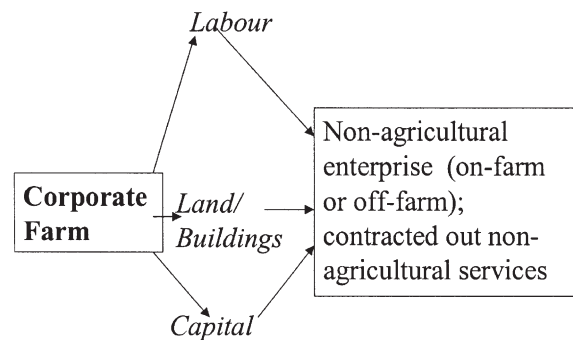


Fig. 2. Diversification in the corporate farm case.

(Fig. 1). For the corporate farms, the emphasis is on non-agricultural enterprises and contracted out off-farm non-agricultural services (Fig. 2).

3.2. Multivariate analysis

In order to investigate the degree of diversification and the factors stimulating or impeding it in the three CEECs, logit analysis is employed. For the corporate farms, the dependent variable is specified as whether the firm has or has not diversified (binary categorical variable). For individual farms, households are classified into four types, non-diversified, diversified through enterprise creation, diversified by off-farm employment or diversified through both enterprise creation and off-farm employment (multivariate categorical dependent). The choice of categorical-dependent variables was necessary as a continuous measure of diversification was difficult to obtain. Respondents have been reluctant

to provide income-related data and information on the allocation of time is unreliable since it depends on memory, and labour may be difficult to apportion between activities.

As mentioned above, unlike in Western Europe, in the CEECs land restitution led to the diversification into agriculture of some not previously engaged in farming. As the main interest of the study is diversification outside agriculture and its input to the rural economy, these diversifiers into agriculture were first excluded from the multinomial analysis in the cases of Poland and the Czech Republic. Diversification into agricultural contracting, woodland activities or off-farm paid work on non-own farms was also excluded, as it was not consistent with the definition of diversification applied in the study. Both adjustments were not feasible for Hungary due to the small sample size. That is why the model was run twice, first, with the whole sample, and second, with the whole sample for Hungary and applying the adjusted definition for Poland and the Czech Republic. As the results were not substantially different, it was decided to discuss the results for the overall sample for all countries in order to have more cross-country consistency.

The independent variables were selected both from the literature on agricultural diversification and an empirical spreadsheet model. In practice, some dummies that related to different forms of advice received by farms were rejected when the model was tested due to the frequency of use being too low, and thus, most values being 0. The list of variables used in the multinomial model is presented in Appendix A.

The multinomial logit applied for the households used non-diversifiers as a reference category. The coefficients for each type of diversification measure the change relative to non-diversifiers. The model can be formulated as:

$$\Pr ob (y = j) = \frac{\sum_{k=1}^k \beta_{jk} x_k}{1 + \sum_{j=1}^{J-1} e^{\sum_{k=1}^k \beta_{jk} x_k}} \quad (1)$$

where y is the dependent variable and x represents the independent variables, of which there are k , each with coefficient β , for j alternatives. If there are four alternatives to choose from (non-diversified, diversified through enterprise creation, diversified by off-farm employment or diversified through enterprise creation and off-farm employment) and the base case; 1 is taken for non-diversifiers, (1) may be written as:

$$\Pr ob (y = j) = \frac{e^{x\beta(j)}}{1 + e^{x\beta(2)} + e^{x\beta(3)} + e^{x\beta(4)}}, \quad j = 2, 3, 4. \quad (2)$$

In the case of the corporate farms, where there are only two options that of diversifying and of not diversifying, the binary model is essentially the same as the multi-

nomial, but with only two options:

$$P_j = \Pr ob (y = 1) = \frac{e^{x\beta}}{1 + e^{x\beta}}. \quad (3)$$

The relative probability of $y = j$ to the base category is calculated as:

$$\frac{\Pr ob (y = j)}{\Pr ob (y = 1)} = e^{x\beta(j)}. \quad (4)$$

The results of the model help identify factors significantly affecting diversification, and provide general insights into farm diversification in Central Europe. However, they cannot provide direct understanding of why or how these effects are observed. In order to unravel the causes of some of the relationships identified through the quantitative research, case studies of successful diversifiers were conducted. The detailed presentation of the results from the case studies is beyond the scope of the present paper, but it is important to stress that such in-depth cases can enhance the understanding of this topic.

Having identified the factors affecting diversification through logit modelling, the sub-sample that consisted of non-diversifiers was analysed further. This helped identify the main impediments faced by non-diversifiers, what influenced their decision to maintain a non-diversified farm portfolio and what were their perceptions concerning the possible effects of various policy instruments on the likelihood of diversifying.

4. Data collection and description of the survey regions

The study is based on primary survey work. Data were collected in three regions in each country using enumerators in the field (Fig. 3). The regions were selected by local experts to reflect contrasting rural environments in each country. For Poland, the three regions selected for the study are mostly agricultural and are disadvantaged when compared to the national average standard of living and the level of unemployment (Table 1). In the Czech Republic, the sample farms are located in three regions in Moravia, in the South East of the country. As in Poland, these are not prosperous regions and have a high unemployment rate and register a mean income below the national average (Table 1). However, their proximity to the town of Brno increases the opportunities for commuting. In two of the regions, industry is well developed and is an important source of employment. The Hungarian sample covers regions that are predominantly agricultural and only in Tapolca, that is close to the northern edge of Lake Balaton, is tourism an important source of employment (Table 1). In the three Hungarian regions the rate of unemployment is high and commuting is impeded by underdeveloped transport infrastructures.



Fig. 3. Map of the selected study regions.

In designing the questionnaire, the historic differences between individual and corporate farms in Central Europe were taken into account. For this reason two separate questionnaires were prepared, one for individual farms and the other for corporate farms. The first was concerned with obtaining information about farm and household characteristics. This questionnaire focused on the recording of the types of diversification engaged in by a household and the proportion of income gained from different sources over the period 1990–2000. One section dealt with employment and allocation of household labour between farm work and non-agricultural activities. An additional section required respondents to rank the importance of potential reasons for not diversifying and the likely effects of policy initiatives on diversification.

The corporate farm questionnaire explored the organisation of the farm and its legal type, financial performance and the characteristics of the management team. As with the individual household questionnaire, it contained a section about employment and the alloca-

tion of labour time between farm work and diversified enterprises. The questionnaire inquired about diversified enterprises at three points in time (1990, 1995 and 2000/01), their field of activities and the level of job creation. The remaining sections contained questions about the reasons of diversification and impediments to diversification faced by those corporate farms that had not diversified, with a particular emphasis on physical and market infrastructure.

Within each region, sampled farms were selected randomly from lists of individual and corporate farms held by central statistical offices.³ However, in the case of unregistered individual farms in the Czech Republic, lists made at the local level were used.⁴ In Hungary and the Czech Republic, both individual and corporate farms were surveyed. In Poland, only individual farms were surveyed due to the low incidence of corporate farms.

The initial Polish sample consists of 342 household farms, most of which fall into two size groups, between 2 and 5 ha and over 15 ha. In comparison to the agricultural census, the main over-representation in the sample is of farms over 15 ha. This bias is acceptable for the main objective of the analysis, to study employment and investment dynamics outside of agriculture for farms that are engaged in commercial activities.

The Czech sample consists of 139 registered and 78 unregistered agricultural households, and 102 corporate farms. The average farm size for the household sample is 35 ha. The farms are larger than the national average of 18 ha according to the agricultural census. The corporate farm sample comprised 37 co-operatives, 24 joint-stock companies and 41 limited liability companies. These have a mean area of 1234 ha, compared to the agri-census average of 886 ha.

The Hungarian sample covers 267 household farms and 44 corporate farms. The household farms have a mean area of 48.5 ha. As in the other countries, the sample is biased towards larger farms compared against census returns. For example, the sample has a disproportionate number of farms in the 5–10 ha range and an under-representation of farms in the category of less than 2 ha. Survey data for the three countries were cleaned for inconsistencies and a summary of usable

³Farms in the chosen regions were selected randomly by assigning a number to all farms listed. The number of such farms (N) was divided by the desired sample size and the result rounded to the nearest integer (i). A number (x) within the range was randomly chosen, becoming the first sampling unit. Then i was added to x , and the number used to select the second sampling unit, then $2i$ were added to x to calculate the third unit and so on until the desired number of units was achieved.

⁴In the Czech Republic, there are two main legal types of individual undertaking in agriculture: (a) *trade law farmers*, subjected to business registration under the Trade Law like other full liability businesses and (b) *solely operating farmers*, with less strict regulations. Registered farms are larger and more commercially oriented than their unregistered counterparts.

Table 1
Characteristics of the sample regions

	Poland			Czech Republic			Hungary		
	Podlaskie	Dolnoslaskie	Podkarpackie	Znojmo	Trebic	Zdar nad Sazavou	Kunszentmiklos	Tapolca	Nyirbator
Agriculture	Predominantly agricultural	Average importance for employment	Small farms combining agriculture with non-agricultural activity	High importance for employment	Average importance for employment	Average importance for employment; small farms	High importance for employment; large farms	High importance for employment	High importance for employment; small farms
Industry and tourism		Declining industry; potential for tourism			High importance of industry for employment	High importance of industry for employment	Declining industry; job losses	Tourism important for employment	
Transport and roads					Poor roads	High density of public transport	Below the country average	Poor roads	Poor roads; bad connections with the rest of the country
Standard of living	Below national average	High unemployment		High unemployment (14%); income below the national average (81%)	High unemployment (12%); income below the national average (77%)		High unemployment (15%)	High unemployment (15%)	High unemployment (20%)

records for individual farms is presented in Table 2 and for corporate farms in Table 3.

5. Results

5.1. Incidence of diversification

Of the household farms sampled, the majority in the Czech Republic and Hungary record an increasing

Table 2
Summary of data used for analysis of individual farms (mean values)

	Poland	Czech Republic	Hungary
Number of used cases	340	183	257
Area (ha)	10.0	25.0	38.8
Proportion under grain crops	0.53	0.45	0.66
Time allocated to farm work (h/week)	29.6	49.6	38.8
Farmer's age (years)	46.2	53.1	50.5
Unearned income EUR/year	2053	803	610
Distance to public transport (km)	0.49	0.45	1.4

Table 3
Summary of data used for analysis of corporate farms by management form and average size (ha)

	Czech Republic		Hungary	
	Number of cases	Mean	Number of cases	Mean
Co-operative	36	1403	11	1307
Joint stock companies	22	1707	3	1283
Limited liability companies	37	1021	8	240
Other corporate	na	na	21	119
Total	95	1325	43	527

Table 4
Percentage of farm households receiving income from different sources for the period 1990–2000

	Poland			Czech Republic			Hungary		
	1990	1995	2000	1990	1995	2000	1990	1995	2000
Farming	98	97	96	17	59	67	30	85	92
Agricultural paid employment	2	1	2	25	12	8	33	9	8
Non-agricultural paid employment	46	49	47	29	28	25	38	32	33
Non-ag on-farm enterprise	1.8	2.6	3.8	0.9	2.8	4.7	6.0	10.0	10.0
Non-ag-off-farm enterprise	3.2	5.0	7.3	3.7	5.1	5.6	4.5	7.5	5.6
Unearned income incl. farm income support policies	7	14	16	4	14	23	33	43	50
Social security government transfers	44	65	66	26	38	43	14	28	35
Remittances ^a	0	0.6	0.6	na	na	na	1.5	3.7	3.4
Other privately generated	0.3	0.6	1.2	0.5	0.9	1.8	0	2.2	2.6

^aFor the Czech Republic, data on remittances were not collected.

frequency of income from independent farming since 1990. Over the same period, agricultural paid employment and non-agricultural paid employment fell (Table 4). This is due to households entering independent farming from agricultural and non-agricultural paid employment as a result of land reform. These developments are not observed in Poland due to the prevalence of private farming during the communist era. In contrast, for Poland the frequency of off-farm paid employment has remained stable. Overall, just under one-half of farm households in Poland have at least one member engaged in non-agricultural paid employment. This is greater than for the Czech Republic and Hungary where approximately one-quarter and one-third of households have at least one member engaged in non-agricultural paid employment. As discussed below, these differences in part reflect variations in farm size, human capital and the availability of non-agricultural opportunities. For all three countries, there has been an increase in the number of diversified enterprises and the importance of unearned income.

Altogether, the sample farms accounted for 46 diversified enterprises in Poland, 120 in the Czech Republic and 96 in Hungary (Table 5). When the definition of diversification, which excludes agricultural contracting, biomass and woodland is applied, the number of diversified enterprises decreases sharply, particularly in Hungary by nearly 45%. In Poland, where individual farms are the smallest, the frequency of investing in a non-agricultural enterprise is the lowest. When the types of diversified activity are examined, in the Polish sample services are most widespread, while for the Czech sample retailing is the most common activity. For both these countries, however, agricultural contracting and forestry are important forms of diversification. For the Hungarian sample, agricultural contracting is the most frequent activity. It appears that adding value to raw agricultural products through

Table 5
Frequency of different types of diversified activity in the sample farms

Area	Activity	Poland	Czech Republic		Hungary	
		Individual farms	Individual farms	Corporate farms	Individual farms	Corporate farms
Retail	Registered farm shops/kiosks	4	32	15	17	2
	Other retail	5	6	6	6	2
Services	Agricultural contracting	10	20	46	28	13
	Construction	2	7	6	3	1
	Other services	16	16	28	6	2
Production	Food processing	0	9	11	0	2
	Manufacturing	1	0	7	3	5
	Other production-based	0	2	6	0	0
Land-based	Biomass		2	3	6	1
	Woodland/forestry	5	20	3	8	12
	Other	1	3	4	0	0
Tourism	Tourist accommodation	1	2	10	7	0
	Other tourist activity			4	2	0
	Other	1	1	9	10	5
Total		46	120	158	96	45
Total (excluding agriculture-based)		30	78	102	54	19

on-farm processing or using the farm for tourist accommodation are poorly developed in Central Europe.

When the data are analysed at a regional level, the specific local context clearly influences the extent of diversification. In Poland, the region with the greatest proportion of diversified households is Podkarpackie, mostly in the form of off-farm employment. This is due to the considerably smaller farms, which are unlikely to generate sufficient income to support a household. This region has significantly more frequent public transport, facilitating travel to off-farm employment. Least diversification has occurred in Dolnoslaskie, which has the oldest heads of household and the least frequent public transport. Diversification here is likely to be hampered also by the high level of unemployment.

In the Czech Republic, the region with the greatest proportion of diversified enterprises is Znojmo. Households there have the highest level of general education and the largest farms. Most off-farm employment is held in Zdar nad Sazavou, which has the best public transport and the smallest farms. Least diversification has occurred in Trebic, which, as a whole, has the poorest relative level of educational attainment, furthest distance to public transport and poor roads. In Hungary, Kunszentmiklós has the greatest proportion of diversified enterprises most probably due to the fact that the largest farms with youngest heads of household are located in this region. The greatest proportion off-farm employment is held in Nyírbátor, which has the smallest farms and best public transport links.

The regional analysis of diversification indicates that farm size and rural public transport are important determinants of the level of diversification. Where there are smaller farms there tends to be greater off-farm employment. Larger farms appear to be more associated with diversified enterprises. Public transport appears to be important with a more frequent and dense network being associated with a higher proportion of households being engaged in off-farm employment.

Turning to the corporate farms, there are 158 cases of diversified enterprises in the Czech sample and 45 in the Hungarian one, when all activities are taken into consideration (Table 5). When a strict definition of diversification as activities beyond the primary production of food and fibre is applied, the frequency of diversified enterprises decreases to 102 in the Czech Republic and 19 in Hungary. Over the period 1990–2001, the number of diversified enterprises nearly doubled in the Czech Republic and increased by 50% in Hungary. The greatest increase occurred at the beginning of transition, between 1990 and 1995. Both corporate farm samples indicate that agricultural contracting is the most frequent type of activity (Table 5).

5.2. Factors affecting diversification

5.2.1. Individual farms

The results of the multinomial logit models of factors affecting household diversification are presented in Table 6 for all three countries. The results show that

Table 6
Multinomial regression results for household diversification

	Czech Republic			Hungary			Poland		
	Divers. enterprise only	Off-farm employ only	Divers. enterprise and off-farm employ	Divers. enterprise only	Off-farm employ only	Divers. enterprise and off-farm employ	Divers. enterprise only	Off-farm employ only	Divers. enterprise and off-farm employ
Constant									
General education	0.130**	0.190***	0.168***	0.127	0.691***	0.385***	-5.11***	-1.62**	-1.71
Agri. education	0.291	0.0263	0.155	-0.615*	-0.563*	-0.189	0.361***	0.396***	0.338***
Use of agri. advice/extension	-0.248	-1.23***	-0.688	0.02003	-1.807**	-0.118	0.499	-0.9*	-0.06325
Unearned income	-0.015**	-0.02***	-0.02***	-0.375	-0.776	-0.188	-0.00	-0.07***	-0.10**
% of farm area under crops	-1.989**	-0.413	-1.643**	-0.09209	-1.543*	-0.574	-1.507	-2.19***	-3.96***
Frequency of public transport	-0.029	-0.036	0.033	0.0413	-0.04591	-0.0275	0.049***	0.079***	0.059***
Distance to public transport	-0.556	0.007	-0.763	-0.327	-0.78***	-1.294**	0.246	-1.31***	-2.072**

Czech Republic: No. observations = 164, $\chi^2 = 65.347$, Prob. value $\chi^2 = 0.000$, Pseudo $R^2 = 0.35$.

Hungary: No. observations = 86, $\chi^2 = 59.396$, Prob. value of $\chi^2 = 0.000$, Pseudo $R^2 = 0.532$.

Poland: No. observations = 340, $\chi^2 = 165.526$, Prob. value of $\chi^2 = 0.000$, Pseudo $R^2 = 0.437$.

*** indicate 0.01 level of significance, respectively.

** indicate 0.05 level of significance, respectively.

* indicate 0.10 level of significance, respectively.

the level of general education has a positive and significant effect on the propensity to diversify (both employment and enterprise diversification). Hungary recorded the only case for which this did not hold (for diversification through enterprise creation alone). The positive and significant effect of general education on diversification has been observed in previous studies (Huffman, 1980; Woldehanna et al., 2000). A higher level of education tends to extend the number of jobs for which an individual is qualified, makes an individual more employable and may increase potential wages, thereby increasing non-farming opportunities. A higher level of education is significant for enterprise diversifiers for several reasons. It may reduce the risks in an enterprise caused by a lack of knowledge or skills; it may enable households to be more aware of potential loans and grants and make them more capable of completing applications for any such funds. In several of the farms participating in the survey, education and skills which were specific to a trade or service were utilised by starting a business in that sphere, since entering a known activity represented a lesser risk.

When agricultural education is considered, there is considerable disparity between the countries. The Czech

results show no significant effect of agricultural education on the level of diversification. Hungary has a significant negative effect on off-farm employment only. For Poland, a significant and positive effect of agricultural education is observed for households with diversified enterprises. The positive effect may be an indicator that any form of education has a positive effect when moving outside a 'known' sphere of activity. Previous studies have also had contradictory results. Benjamin (1994) and Mishra and Goodwin (1997) observed a significantly negative effect for agricultural education. In contrast, Woldehanna et al. (2000) found no significant effect of agricultural education on off-farm employment.

Agricultural extension and advice has a significantly negative effect on participation in off-farm work for all countries. This is consistent with the research of Mishra and Goodwin (1997) who postulate that this is a result of increased returns to agricultural labour, and, therefore, leads to an increase in the reservation wage. In the CEECs, the use of agricultural extension and advice also indicates more commercial and larger farms since it would be difficult for a subsistence producer to utilise such services.

Unearned income has a significantly negative effect on the propensity to take-up off-farm employment or pursue enterprise diversification in Poland. For the Czech Republic the same effect is present for all forms of diversification, whereas for Hungary, the effect is not statistically significant. Previous research has found a significant negative effect of unearned income on off-farm employment (Sumner, 1982; Thompson, 1985; Woldehanna et al., 2000). The reason is that unearned income reduces the variability of total income and, therefore, decreases income risk. An interesting point to note in light of this is that Hungary has directed most of its agricultural support towards market price support. In contrast, in Poland most of the transfers to farmers occur via the agricultural pension scheme (KRUS), while the Czech Republic has split up the funds between credit and market support.⁵ The difference in effect for unearned income may be due to the lower income risk for agricultural producers in Hungary compared to the other two countries; thus, unearned income plays a less important role in reducing income volatility.

The degree of specialisation within agriculture has a significantly negative effect for all three countries, however, there were country variations depending on the forms of diversification. The proportion of farm area under grains was used as a rough proxy for the degree of specialisation in agriculture. A lower proportion of grain area indicates a certain level of diversification in agricultural production (mixed farming). For Hungary, the negative effect is significant for off-farm enterprises only, for the Czech Republic for diversified enterprises alone and in combination with off-farm employment, while for Poland the effect is for off-farm employment, both alone and in combination with diversified enterprises. It is feasible that off-farm employment is a preferable method for diversifying risk, as it provides a less variable income stream than enterprise diversification. In the case of the Czech Republic, where a negative correlation was found between the proportion of farm area under grains and diversified enterprises rather than off-farm employment (which is different from the other countries), this could be due to the main forms of agricultural support being market intervention and credit subsidies. Credit support makes starting a diversified enterprise more feasible as a means to diversify risk. This is corroborated by a greater frequency of diversified enterprises in the Czech Republic than either Poland or Hungary.

The availability of public transport is an important factor in the propensity to diversify. The effect of the frequency of public transport is insignificant for the Czech Republic. In Hungary, it shows a positive and significant effect for the propensity to take-up off-farm

employment. For Poland, the effect is positive and significant for all forms of diversification. This variation may be due to the number of households with private cars and thus the numbers not reliant on public transport. In the Hungarian sample, 85% of households own a private car, compared to 65% for Poland. Unfortunately, comparative information is not available for the Czech sample. The distance to a public transport stop exerts a significantly negative effect in Hungary and Poland, but not in the Czech Republic.

5.2.2. Corporate farms

As explained in Section 3, the factors affecting the diversification of corporate farms are investigated using a binary regression model. Statistical tests applied to test the fit of the model for the Czech and Hungarian corporate farms indicated that the results are robust. The variables that are found to have a significant effect are principally related to human capital (Table 7).

The level of agricultural and general education of the management team both have a significant and positive effect on diversification in the Czech Republic. However, agricultural education appears to be more important. This effect is not consistent with previous research on households, which indicated a negative effect of the level of agricultural education on household diversification (Benjamin, 1994; Mishra and Goodwin, 1997). However, higher levels of agricultural education are common amongst managers and are likely to have been important for them to gain the managerial position. Generally, corporate farms have agricultural production as their central activity with diversified enterprises being of lesser importance. Thus, it is expected that corporate farm managers are appointed on the basis of their agricultural competence. Agricultural contracting and land-based enterprises are a widespread form of diversification and competence in this field may be related to agricultural education.

It is likely that many members of the current management team had been managers in the pre-reform era, when the diversification of collective and state farms was encouraged. For this reason, it was hypothesised that previous experience, proxied by the number of years of managerial experience, has an influence on the decision to diversify. Empirical support for this hypothesis was found in Hungary, but not in the Czech Republic. In fact, this is the only variable found to be significant for the Hungarian sample. Neither education, nor use of agricultural extension is statistically significant. The positive effect of years of managerial experience indicates that in Hungary experience is more important than education in the decision to diversify. In many cases, managers have had experience of operating non-agricultural enterprises in the pre-reform era and such experience may give them the impetus to diversify again or maintain existing diversified enterprises (Boeker, 1997).

⁵In mid-1990s, the support for the system of farmers' pensions accounted for nearly three-quarters of the Polish agricultural budget (OECD, 1995).

Table 7
Factors affecting diversification of corporate farms

	Czech Republic		Hungary	
	Coefficient	Standard Error	Coefficient	Standard Error
Agricultural education of management team	0.339***	0.106	-0.393	0.381
General education of the management team	0.154*	0.092	-0.274	0.308
Years of managerial experience	-0.003	0.009	0.124**	0.063
Use of agricultural extension	-2.011**	0.950	-1.798	1.590
Frequency of public transport	0.046	0.032	-0.059	0.085
Percentage of members or shareholders providing labour ^a	0.03	0.009	0.034	0.031

^aFor Hungary, this variable is the number of owners of a corporate farm.

*** indicate 0.01 level of significance, respectively.

** indicate 0.05 level of significance, respectively.

* indicate 0.10 level of significance, respectively.

The receipt of agricultural extension and advice has a significantly negative effect on the propensity of corporate farms to diversify in the Czech Republic. This is consistent with previous findings for households. Advice is linked to higher returns in agriculture, which reduces the drive for diversification when the latter is induced by financial needs. Extension may also reduce some of the variability of production, reducing production risk. This would reduce the desire for diversification when motivated by the objective to smooth revenue.

Although it would have been interesting to test the influence of different management forms in the model, this was not possible due to the relatively small sample size. The proportion of members and shareholders providing labour was included to try to incorporate the effects of legal form but this was found to be insignificant for the Czech Republic. In Hungary, due to data availability, the number of owners was included in the model but also proved to be insignificant. This indicates that fragmented ownership does not have a significant effect on the decision to diversify itself.

In summary, for corporate farms, the stock of human capital appears paramount in the propensity to diversify, but there is a significant difference between the two countries. For the Czech sample, the significant aspects of human capital are the level of education of the management team and the use of extension services. In the Hungarian case, it is the experience of managers. Public transport and ownership variables are insignificant for both the countries.

5.3. Impediments to diversification and policies perceived to facilitate diversification

In order to identify the reasons why households and corporate farms did not diversify and what policies can

Table 8
Summary of the impediments to diversification of household farms (%)^a

	Poland	Czech Republic	Hungary
<i>Enterprise diversification</i>			
Concentration on farming	78	79	61
Lack of capital or credit	60	67	93
Insufficient knowledge or skills	38	0	61
Remoteness	22	61	45
<i>Off-farm employment</i>			
Concentration on farming	50	50	73
Insufficient knowledge or skills	50	19	44
High regional unemployment	100	31	44
Insufficient public transport	9	0	44

^aThe percentages were calculated by expressing the share of non-diversifiers that rated a particular impediment as important.

influence their decision, the sub-sample of non-diversifiers was analysed further. All farms interviewed were asked to rank a list of impediments and potential policy initiatives on a scale of 1–5, with 1 indicating an insignificant and 5 a very significant influence.

The reasons given by households for not pursuing enterprise diversification indicate that a desire to focus on farming is an important factor for 78, 79 and 61% of the Polish, Czech and Hungarian sub-samples of non-diversifiers, respectively (Table 8). This may seem counterintuitive given the relatively low level of farm incomes in the CEECs. However, two points should be highlighted. First, excepting Poland, individual farmers in the other two countries are relatively new and many have been motivated by a desire for historic justice and the re-establishment of their family farm, which was lost in the collectivisation process (Swain, 1999). Second, in anticipation of the implementation of the CAP following accession, some CEEC farmers are

currently augmenting their farm area and output in order to take advantage of the expected CAP market support prices and direct payments.

The households who would like to concentrate on farming have some common characteristics. They have either a larger size than the average farms, as in Poland and the Czech Republic, that may suggest a higher farm income and the possibility to maintain the family's standard of living through farming, or they are located furthest from public transport and/or with the least frequent service. The latter highlights the problem of remoteness in terms of both the costs of reaching customers and providing inputs to a non-agricultural enterprise.

The second most important impediment is the lack of capital or credit. It is emphasised by 60, 67 and 93% of the Polish, Czech and Hungarian sub-samples, respectively. Insufficient knowledge and skills are identified as important for 38% of the Polish sub-sample and 61% of the Hungarian sample but appear relatively unimportant in the Czech case.

The reasons for not taking up off-farm employment vary across the countries (Table 8). For the Polish sub-sample, high regional unemployment is cited by the majority. This impediment is less important for the other countries. For all the three countries, those with the smallest farms are most likely to indicate insufficient knowledge and skills. However, for Poland and Hungary, those indicating that they have insufficient knowledge and skills are also more likely to identify high regional unemployment as an important impediment. Some of the Polish households are also concerned with insufficient public transport.

Corporate farm managers largely perceive diversification to be positive, generally indicating that it is for progressive managers and that it provides an opportunity to be successful in business. The most important reasons for not diversifying cited are a desire to concentrate on farming, insufficient capital, the risk of non-agricultural investment and a lack of available credit.

The perceived impacts of CAP first pillar support measures on the propensity to diversify vary between the three countries. For Poland, price guarantees and direct payments for agricultural production are perceived by households as the most important policies that reduce the motivation to diversify. Czech farmers are more likely to be affected by tax exemptions and subsidised inputs. The importance given to different policy instruments indicates that the mix of agricultural policies extended to the acceding countries and the introduction of direct payments will impact on the magnitude of diversification. For Hungary, the impact of agricultural policy on the likelihood of diversification is less pronounced.

In considering possible proactive policies to stimulate enterprise diversification, for all the countries, farm

households indicate the most important to be financial measures. The most critical financial measure identified is the provision of seed-money for starting up an enterprise, with loan guarantees and interest rate subsidies being given almost equal importance. Corporate farm managers provide similar responses. These are consistent with the indication that insufficient capital and a lack of available credit inhibit diversification.

5.4. *Outcomes of the diversification process*

Enterprise diversification has been promoted as a strategy for increasing rural employment and incomes and for this reason is analysed in detail. Diversified enterprises created by farm households do not appear to be a major source of new jobs (Table 9). In the Czech Republic, the diversified enterprises associated with individual farms account for less than 20 full-time equivalent jobs (assuming two part-time jobs equals one full-time position). In cases where family members did not take up the jobs, nearly all employees were recruited locally. The development of businesses on land or buildings leased or sold by a farm appears to be more important for job creation than diversified enterprises established by farmers. In Hungary, diversified enterprises created 55 new jobs and eight were created through business development. Corporate farm diversification is more important than individual farm diversification in creating new employment opportunities, especially in the Czech Republic.

In all countries, households which diversify and create new jobs tend to have younger heads of household, higher education, better public transport, and a lower level of unearned income when compared to all enterprise diversifiers (Table 10). The lower level of unearned income is consistent with younger heads of households as most unearned income is derived from pensions. A greater proportion of diversifiers who created jobs have both off-farm employment and diversified enterprises as compared to all enterprise diversifiers. This may be because off-farm employment provides a safety net in terms of a secure income that enables the household to take the risk to have employees and to be able to pay wages and social security contributions. However, in Poland the latter contributions appear to be one of the biggest impediments to job creation. In contrast to the strongly subsidised farmers social security system (KRUS), the non-agricultural system (ZUS) requires relatively high contributions from the employer. According to one set of calculations (Wtulich, 2002), the minimum annual compulsory contribution to KRUS in 2002 was 234 EUR, whilst the amount due to ZUS was 1559 EUR, shared between the employee and the employer.

The expectations for the future are somewhat pessimistic; most respondents aim to maintain their

Table 9
Number of jobs created by diversified enterprises formed by individual and corporate farms, 2001

	Poland		Czech Republic		Hungary	
	Individual farms	Corporate farms	Individual farms	Corporate farms	Individual farms	Corporate farms
Full-time jobs	5	18	219	41	137	
Part-time jobs	15	3	10	14	0	
Jobs created by business development ^a	2	60	1,024	8	1	
Jobs expected to be created in the next three years	3	104	27	9	3	

^a Business development refers to businesses created on land or buildings that were leased out or sold by an individual farm.

Table 10
Characteristics of individual farms creating jobs through enterprise diversification, 2001

	Poland		Czech Republic		Hungary	
	Job creators	All enterprise diversifiers	Job creators	All enterprise diversifiers	Job creators	All enterprise diversifiers
Cultivated area (ha)	16.1	15.9	66.5	24.6	32.2	49.8
Age of head of household	43.9	42.3	45.3	50.3	45.7	48.4
Number of hours worked on farm by head of household	26.7	31.7	48.9	48.8	36.2	36.9
General education (years)	8.6	7.8	11.4	9.3	8.9	8.1
Agricultural education (years)	2.0	1.6	0.9	0.8	3.3	3.0
Unearned income (€)	1,865	2,175	312	717	113	568
Distance to public transport (km)	0.32	0.51	0.37	0.46	1.2	1.3

operations at the current level. The prospects for employment are better in the Czech Republic where in the next 3 years there is an expected increase in employment in diversified enterprises by 104 employees (on a total of 55 farms). Overall, the pattern of enterprise diversification in the region follows the findings on non-agricultural small rural businesses; the majority display a stable pattern of employment and only a tiny minority grow rapidly. Thus, the contribution of enterprise diversification to new job generation in rural areas is currently modest and there is little evidence that this will change in the future.

The other outcome of diversification is that it helps to increase household income. In each of the countries studied, households were asked to provide income data (within pre-set bands). The bands were adjusted to the income situation in each country and suggested by local experts. The frequency of different sources of income within income bands is shown in Table 11. In all countries, the lowest income group has the greatest proportion of non-diversifiers. Diversifiers either through enterprises, off-farm employment or both are over-

represented in the higher income brackets in both Poland and the Czech Republic. This indicates that higher incomes are achieved by engaging in non-agricultural activities. The picture in Hungary is more complex. The lowest income group, as in the other countries, has the least diversified activity (40% of households in this group). This share drops for the second income group to 22%. However, moving to the third and fourth income bands, the share of farm households relying solely on agricultural income increases to 29 and 37%, respectively. Davidova et al. (2002), investigating the farm performance of commercially oriented farms in the three countries studied, conclude that farms in Hungary are far more profitable. The Hungarian farms sampled generated 5 times greater net value added per annual work unit on average than the sampled Czech farms and 8 times more than Polish farms. While the samples for diversification and the farm performance studies are not entirely equivalent, it is feasible that more Hungarian farms provide an agricultural income that places dedicated agricultural households into the higher income groups than in the other two countries.

Table 11
Percentage of different income sources within income groups (euro/year)

	Poland				Czech Republic				Hungary			
	Less than 1500	1500– 3500	3500– 6000	Over 6000	Less than 4000	4000– 9000	9000– 13,000	Over 13,000	Less than 3500	3500– 7000	7000– 10,000	Over 10,000
Farming only	91	64	31	15	34	23	23	0	40	22	29	37
Off-farm employment	9	35	62	60	33	33	23	25	30	47	26	22
Diversified enterprise	0	1	4	12	14	17	8	50	14	9	9	18
Diversified enterprise and off-farm employment	0	1	4	13	20	27	46	25	16	22	37	23
Total	100	100	100	100	100	100	100	100	100	100	100	100

6. Conclusions

In Western Europe, agricultural diversification has been promoted to aid adjustment to more liberal markets and deal with declining real protection within the EU. In devising policies for diversification, the EU and member states, and academic studies of pluriactivity that have sought to analyse policy effectiveness, have conceptualised the unit of analysis to be the farm household. Adjustment strategies have been developed within a specific historical and institutional context and these are currently being transposed to the candidate countries within the SAPARD programme (European Commission, 2000). However, the candidate countries are characterised by a more diverse set of agricultural actors and a very different historical trajectory. This presents many problems for governing agriculture in an enlarged Union as the nature of agricultural adjustment is fundamentally different. This raises concerns about the direct transposition of West European adjustment strategies.

The empirical evidence presented in this paper on the three candidate countries indicates that the amount of enterprise diversification by farmers has been relatively small. Employment diversification is more common, especially in Poland, where just under one-half of all farm households have at least one household member engaged in non-agricultural paid employment. There is no neat pattern of gradual disengagement from agriculture either in Poland, with its tradition of peasant farming, or Hungary and the Czech Republic, where due to the land reform process and wider economic restructuring a substantial number of new independent farmers emerged in the 1990s. Considering farm households, overall less than 10% have pursued enterprise diversification, although diversified enterprises are more prevalent in the Czech Republic than Hungary or Poland. There is some evidence that enterprise diversification by corporate farms is more likely to lead to the creation of new jobs although much of this activity revolves around agricultural contracting. However, overall there is very little evidence of household or corporate farms generating significant numbers of non-

agricultural enterprises or new employment opportunities. Results from the multinomial logit models indicate that diversification (both enterprise and/or off-farm employment) is linked to the level of general education and availability of public transport. These infrastructural issues are poorly addressed in current EU-led initiatives for rural development in the associated countries, which focus principally on farm-based initiatives. The degree to which the provision of first pillar support (conventional agricultural market and income support) will clash with second pillar measures (rural development, enterprise diversification) has not been addressed. From this study, it appears that policies that increase agricultural price support and the introduction of direct payments will lower the propensity to diversify and *vice versa*. The nature of the agricultural policy afforded to the applicant states on membership will thus impact on patterns of diversification. Such agricultural policies may be in conflict with the objectives of SAPARD and the consistency of the first and second pillar measures in their application to the candidate countries is thus questionable.

Finally, encouraging enterprise diversification by farmers is in itself unlikely to generate significant new jobs and solve the problem of high rural unemployment in the CEECs. This leads to the question as to whether farmers can be the main drivers of structural change in rural areas. In order to answer this question further research is necessary about farmers' investments decisions in the wider rural economy. However, this study suggests that at present there is little evidence that farmers will serve as drivers and there is a need to reassess the contribution of farms to wider rural development objectives. SAPARD is a very 'farm-centric' rural development programme, but this targeting appears misplaced. In pursuing a policy of new rural enterprise and employment generation in the CEECs, the main challenge may be to unlock farm assets (land and buildings) for use by other non-farm actors. This calls for a different set of policy interventions for CEECs that are more typical for support to small and medium size enterprises than to the CAP.

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Appendix. A

Variables used in the multivariate analysis are given below.

- General education was coded according to highest level attained: 1 represented no education, 2 primary, 3 high school without graduation, 4 high school (completed) and 5 university. This was then summed for the household or management team for corporate farms, including all members who were over 16 and had completed their education.
- Agricultural education was coded with 0 for none, 1 for agricultural high school and 2 for agricultural university. As for general education, this was summed for all household or management team members for corporate farms.
- Years of managerial experience. This was the total years of experience of the management team for corporate farms.
- Use of agricultural extension and advice was a dummy variable coded 1 for use and 0 for no use.
- Unearned income was the amount of unearned income gained annually divided by 1000 (for Hungary, it was divided by 100,000 due the exchange rate of the forint against the euro). The division was necessary, as the figure for unearned income was very large in proportion to other variables providing an almost infinitesimal coefficient under multinomial analysis.
- Frequency of public transport was the number of times public transport visited the closest stop per day.
- Distance to public transport was the distance in kilometres between the household or corporate farm and the nearest public transport stop.
- Farm area was the total utilised agricultural area in hectares.
- The proportion of farm area under grains. This was taken as a proxy for the degree of specialisation. Grains were used for this purpose since they carried the greatest number of observations.
- Number of owners was the number of owners of a corporate farm.
- Age of head of household in years.
- The time allocated to farm work was the average time in hours devoted by the head of household to farm work per week over a year. Values greater than 100 were excluded from analysis since there are only 168 h per week and some time must be devoted leisure.

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