RURAL LIVELIHOODS IN THE EU NEW MEMBER STATES: SUBSISTENCE PRODUCTION VERSUS MARKET INTEGRATION

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Abstract

Commercialisation of small farmers, of which many are subsistence farmers producing mainly for own consumption needs, is an important policy objective for the restructuring process of the farm structure in the EU New Member States (NMS). Drawing on primary survey data from five EU NMS, this paper first assesses the importance of subsistence farming in the NMS through the valuation of subsistence production at market prices. Secondly, the paper analyses the differences between subsistence and commercial households. Where previous studies normally classify households as subsistence or commercial based on a pre-defined threshold, the use of latent class regression in this paper represents a way to systematically analyse heterogeneous groups of households in a more objective way, as determinant of class membership (subsistence or commercial) is not pre-defined. The latent class regression provides evidence of two classes – one subsistence and one commercially oriented – who differ in behaviour with respect to a set of explanatory variables accounting for attitudes, production and household characteristics.

Keywords

Agricultural households, subsistence, commercialisation, market integration, latent class regression

JEL classification: Q12, Q18

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1. Introduction

Twenty years after the start of economic reforms in Central and Eastern Europe (CEE), the farm structure in many EU New Member States (NMS) continues to be characterised by a large number of small-scale farms and a small number of large farms. Many of the small-scale farms still produce mainly for their own consumption with limited market participation. The lack of engagement in markets has been identified as an impediment to economic growth and contributor to rural poverty (World Bank, 2007). A transition to commercial farming may, therefore, be regarded as a favourable development. At the same time, subsistence farming may play an important role for poverty alleviation by providing a safety net for the rural poor.

The objectives of this paper are, first, to analyse the contribution of subsistence farming to the agricultural household incomes, and thus its role as a safety net; second, to identify whether the agricultural households are heterogeneous in respect to their market integration; and third, to find out to what extent the subjective attitudes to farming and some objective factors related to farm endowments, location etc can explain the difference in market integration between classes of farmers. The paper starts with a brief introduction to some definitional issues. This is followed by an overview of the prevalence of subsistence farming in the NMS. Then the methodology for a typology of subsistence oriented vs. market integrated households is presented followed by a short description of data. The last two sections include a presentation of the analytical results and a discussion of their policy implications.

2. How to measure subsistence farming?

Generally speaking, subsistence farms are usually associated with small family farms who engage in agricultural activities primarily to satisfy household food needs. This is opposed to profit-oriented commercial farms, sometimes called farm-firms, whose primary objective is to produce for the market. The latter maximise profit, which subsequently is used for consumption, but consumption and production decisions are separated and household consumption needs do not influence the production decisions, e.g. allocation of labour. Sometimes, the term semi-subsistence is applied to indicate a mix between producing food for the household and selling to the market.

However, there is no universally agreed definition for subsistence/semi-subsistence farming. In general, subsistence farming is defined based on one of the three following criteria: physical measures, economic size and market participation. Physical measures, such as agricultural land, volume of inputs and number of livestock, may define subsistence through thresholds. McConnell and Dillon (1997) suggested that 0.5-2.0 ha of cultivated land might be a good proxy indicator for semi-subsistence farms. However, fertility of land may differ and farm specialisation may imply production with different land intensity. This undermines the strength of the land size as a general indicator. Economic size thresholds are widely applied for statistical and policy purposes, particularly in the EU. In the EU Farm Structure Surveys (FSS) and Eurostat's corresponding series "Statistics in Focus", farms smaller than 1 ESU are labelled as subsistence farms and farms smaller that 8 ESU as small farms.[1] In this study it is assumed that farms within the size group of 1 to 8 ESU are 'semi-subsistence'.

The market participation criterion is probably the most adequate when differences between subsistence and commercial farming have to be identified. Wharton (1969) argued that farm households could be placed on a continuum from zero to 100 per cent depending on the proportion of their output sold. At the two extremes are purely subsistence and purely commercial operations. With regard to this continuum, Wharton introduced a threshold of 50 per cent of marketed output, classifying farmers selling less than this as subsistence and semi-subsistence, while labelling those above the threshold as semi-commercial and commercial. Considering that most farm households in the NMS sell at least a part of their output, no distinction between subsistence and semi-subsistence is

[1] ESU stands for European size unit and corresponds to a standard gross margin of EUR 1 200 that is used to express the economic size of an agricultural holding or farm.
(http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:Economic_size, accessed 07-06-2010).

made in the analysis in this study. Recognising that commercially oriented households are more integrated into markets, the terms "commercial"/"market integrated" and "commercialisation"/"market integration" are sometimes used interchangeably.

The quantification of subsistence farming in the NMS is naturally sensitive to the selected definition, as illustrated by tables 1 to 3 below. The first table gives an overview of subsistence/semi-subsistence farms in five selected NMS - Bulgaria, Hungary, Poland, Romania and Slovenia covered by a primary survey - according to the total number of holdings in different size groups in relation to the land area. Table 1 indicates that according to McConnell and Dillon's (1997) definition, a majority of farmers in Bulgaria, Hungary and Romania are semi-subsistence.

Table 1. Share of total number of holdings by farm size measured in hectares, 2007 (%)

Farm size*	**Bulgaria**	**Hungary**	**Poland**	**Romania**	**Slovenia**
0<2	87	82	44	65	25
2<5	8	8	24	25	34
5<20	3	7	26	9	37
20<	2	4	5	1	4
Total	***100***	***100***	***100***	***100***	***100***

* The farm size is measured in hectares of Utilised Agricultural Area (UAA). The UAA comprises total arable land, permanent pastures and meadows, land used for permanent crops and kitchen gardens. The UAA excludes unutilised agricultural land, woodland and land occupied by buildings, farmyards, tracks, ponds, etc.

Source: Eurostat FSS data (2007)

Table 2 illustrates the share of holdings by economic size within the total number of holdings and the share of UAA (Utilised Agricultural Area) managed by each ESU group. The table shows that with the exception of Slovenia, farm structure is dominated by farms <1 ESU, i.e. subsistence farms according to Eurostat FSS definition. Bulgaria, Hungary and Romania have particularly high shares of subsistence farms. The total UAA of farms <1 ESU is generally low, especially in Bulgaria and Hungary where more than three quarters of holdings only manage 4 to 6 per cent of total UAA.

Table 2. Farm structure by ESU and corresponding UAA, 2007 (%)

ESU	Bulgaria		Hungary		Poland		Romania		Slovenia	
	% of total farms	% of total UAA	% of total farms	% of total UAA	% of total farms	% of total UAA	% of total farms	% of total UAA	% of total farms	% of total UAA
<1	76.1	6.0	77.5	4.1	52.8	10.5	78.0	30.9	18.4	5.6
1<8	21.6	10.8	17.9	13.7	36.9	38.0	21.4	31.3	66.0	50.1
8≤	2.3	83.2	4.6	82.1	10.3	51.6	0.6	37.7	15.6	44.3
Total	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*

Source: Eurostat FSS data (2007)

Table 3 presents an overview of the share of holdings producing mainly for own consumption within the total farm structure and their corresponding shares of UAA. According to this definition, the shares of households defined as subsistence and semi-subsistence decrease across the board compared to the definition based on a threshold of 8 ESU. The table indicates that the share of subsistence oriented farmers has remained fairly constant between the two years 2005 and 2007, except for in Slovenia where it decreased by eight percentage points. Farms producing mainly for own consumption dominate the farm structure in Bulgaria, Hungary, Romania and Slovenia. Still, 38 per cent of farmers in Poland can be defined as subsistence oriented according to the selected measure. The table also shows large country differences in the UAA managed by these farms, from an almost negligible percentage in Bulgaria to more than 40 per cent in Romania.

Table 3. Share of holdings producing mainly for own consumption (% of country total, 2005 and 2007)

Country	No. of holdings (%)		UAA (%)	
	2005	2007	2005	2007
Bulgaria	68.8	69.7	11.7	6.5
Hungary	83.5	83.4	19.6	17.0
Poland	41.0	38.0	14.3	13.8
Romania	80.9	80.7	42.0	41.4
Slovenia	68.4	60.5	42.7	32.4

Source: Eurostat FSS data (2005 and 2007)

To conclude, the extent of subsistence/semi-subsistence farms within the farm structure is sensitive to the definition applied. However, irrespective of the definition the prevalence of semi-subsistence farms in the farm structure of NMS is the most typical case. The persistence of subsistence farming has been explained in the economic literature by market failure and particularly high transactions costs[2] (e.g. Goetz, 1992; Omamo, 1998; Key *et al.*, 2000). The evidence is that subsistence and commercial farms co-exist, which is explained by farm households facing different transactions costs and being affected differently by market failures (e.g. de Janvry *et al.*, 1991; Key *et al.*, 2006). The general wisdom is that subsistence farms are not market integrated and market based policies cannot be effective. Recently, this isolation from output markets and non-responsiveness to price signals has been challenged. Dyer *et al.* (2006) argue that subsistence households do adjust their supply to changes in agricultural output prices through multiple factor linkages when there is at least a single commercial producer in the vicinity. In the EU NMS there are commercial producers in most of villages, thus the subsistence/semi-subsistence farms may react to output price changes even if indirectly.

The transactions costs arguments claim that households are forced into subsistence by economic shocks and/or imperfect markets; hence, subsistence farming is not a voluntary choice but a necessity. As long as there is perpetuation of "selective" market failures, affecting heterogeneous farm households differently (de Janvry *et al.*, 1991), subsistence farming will persist. However, subsistence farming might be a strategy selected by choice. Subsistence production could be favoured by households with non-farm income or by retired households in order to satisfy their lifestyle and consumption preferences, which is usually named as 'hobby farming'.

3. Methodology

The methodology employed here involves three steps necessary to provide insights into the factors important to differentiate between subsistence and market integrated farmers. The first step is the valuation of unsold output and the analysis of its importance for the household income of various types of farms households. This step helps answer the following questions: (i) does subsistence farming provide an important contribution to household incomes? (ii) is this contribution more important in the poorest EU Member States (Bulgaria and Romania) than it is in the Central European countries? (iii) what is the role of subsistence farming for poor households? Petrovici and Gorton (2005) argue that it is necessary to estimate the role of subsistence production not only for a mean household but particularly for the poor and vulnerable households. In this study in order to identify poor households, the Eurostat definition of at-the-risk-of-poverty is used. This measure refers to individuals living in households where the equivalised income is below the threshold of 60 per cent of

[2] There are various types of transaction costs which can affect household behaviour. In the literature, two broad categories of transaction costs have been studied: i) variable transactions costs, which can be either proportional or non-proportional, are quantity-related costs of accessing markets that arise from transportation and imperfect information and include costs such as per-unit transport costs and price premiums that stem from bargaining capacity; and ii) fixed transactions costs that are independent of the quantity traded and normally occur once the decision to take part in the market has been made. Such costs include (i) information costs (searching for customers/sales persons that offer the highest price); (ii) bargaining costs (bargaining and negotiation); and (iii) monitoring costs (screening, enforcement and supervision).

the national equivalised median income. Equivalised income is defined as the household total income divided by the equivalised size of the household. The household equivalised size was calculated using the modified OECD equivalence scale.[3]

The second step in the methodology is concerned with gaining an understanding of household attitudes and perceptions about agricultural activities, notably with regards to production and commercialisation. The recorded survey data (see section 4) contained rich attitudinal information about the farm households' current aims in farming; their assessment regarding household agricultural production; their perceptions about the impediments they face to commercialisation and those measures they believe could facilitate an increase in their market integration. Within the country surveys, respondents were asked to answer statements related to their aims in farming; their attitude towards their current agricultural activities; their perceptions about barriers to increase output and some measures that might enable them to increase the share of output sold. Households had to state the degree to which they agreed or disagreed with the set of statements, measured on 5-point Likert scales from 'Totally disagree' - 1 to 'Totally agree' – 5, with 3 being a neutral option. Altogether, 28 attitudinal statements were included in the questionnaire.

In order to assess the structure of the interrelationships between these variables, and summarise and reduce the data, factor analysis was performed (Hair *et al.*, 2006). Factors presenting an eigenvalue of one or greater were chosen. The cut-off applied here used factor loadings (the correlation coefficients between a variable and a factor) ≥ 0.5 on at least one factor. The application of factor analysis was justified by two tests: the Barlett test of sphericity to test the null hypothesis that the inter-correlation matrix comes from a population with non-collinear variables, and the Kaiser-Meyer-Olkim (KMO) measure of sampling adequacy to define whether the data matrix has sufficient correlation to justify the application of factor analysis.

The third step consisted of a latent class regression with the dependent variable being the share of production sold, considered as a proxy for market output integration. As the frequency of 0 per cent sales was higher than what would be the case should the dependent variable follow a normal distribution, a censored linear regression (Tobit) was applied. The factor scores together with a range of other variables that were expected to affect the market integration were included as explanatory variables in the regression, including the total cultivated area, household time allocation, equivalised size of the household, and farm location characteristics. The selection of latent class regression was justified as the data contains responses from a very diverse range of farm household types, which are likely to be affected differently by market failures and transactions costs. Consequently, households may differ in response to policy measures aimed at increasing market integration. For example, it cannot be assumed that all farmers would benefit equi-proportionally from the improvement in market information provision. Those farmers already selling a large share of their products may gain very little, while those who sell very little may be able to use the information to change their product mix in order to sell a significantly higher proportion of high value products once they are aware of an opportunity. Therefore, the regression analysis employed had to be flexible enough to allow the potential heterogeneity between different types of farm household to emerge, which is possible within the selected regression framework. The basic idea of latent class regression is to specify a regression model from the generalised linear modelling (GLM) family in which variables are allowed to differ across latent classes as the traditional assumption of homogeneity is relaxed. This is made possible by the inclusion of a latent categorical variable, which allows the switching of observations into two or more classes where each category represents a homogenous class of observations (households in this case). Simultaneously, different regression models for each category are estimated.[4] The regression analysis was carried out using Latent GOLD® which allows for imposing restrictions on the explanatory variables to improve model fit, and also contains diagnostic statistics to determine the number of classes and to select the preferred model specification.[5] The general criteria for selecting the number of classes are the R^2 statistics and Bayesian Information Criterion (BIC). The higher the R^2 and the lower the BIC-statistic, the better the model. Assessing the relevancy of imposing restrictions

[3] This scale gives a weight of 1.0 to the first adult, 0.5 to any other household member aged 14 years and over, and 0.3 to each child. http://www.oecd.org/dataoecd/61/52/35411111.pdf (13-07-2010)

[4] For a non-technical introduction to latent class modelling see Madigson, J and Vermunt, J.K. (2002) and for a technical overview refer to Vermunt, J.K. and Madigson (2005).

[5] Latent GOLD® is a latent class and finite mixture program developed by Statistical Innovations Inc.

on a model is done through comparison of the BIC-statistics and the statistical significance of the restrictions is tested by applying a log-likelihood ratio test based on the reported LL-statistics for the two models (unrestricted and restricted model, respectively). The inclusion/exclusion of selected variables in the preferred regression model was done based on the statistical significance of parameters explanatory power on the dependent variable, i.e. parameters presenting a p-value above the 10 per cent level were excluded from the final model.

4. Data

EU FP6 SCARLED project surveyed rural households with agricultural production in the five countries during late 2007 and early 2008. The reference year for the survey was 2006. In each country, three regions were selected according to GDP/capita (one below, one above and one around the national average after excluding the large city regions). Three villages per region where then selected and households in the selected villages were selected randomly.

One of the objectives of this study requires a valuation of the unsold output (subsistence production). This was valued product by product at market prices as a proxy for opportunity costs. If a household has sold a portion of the output in the market, the same price was imputed to the unsold quantity as it was assumed that the price the household had achieved was the best indication about the quality of output. In cases when the household consumed 100 per cent of the output, crops were valued using a weighted average price for the village. In some instances, where there were only a few observations of output sold in a particular village and there was a large difference in reported prices, either regional averages or country averages reported by the national statistics were imputed.[6] As data from the five countries were merged, all values were converted in Euro using Eurostat purchasing power parities (PPP) for 2006, the reference year for the collected data.[7]

After cleaning the SCARLED survey data, 616 observations contained information for the variables of interest. Out of these 616, 84 were agricultural households in Bulgaria, 85 in Hungary, 140 in Poland, 165 in Romania and 142 in Slovenia. The descriptive statistics is presented in Table 4.

Table 4. Descriptive statistics of the sample analysed

Variables	Min	Max	Mean	Std. Dev.
Age of household head	22.00	89.00	54.76	12.908
Household time on-farm (%)	0.10	92.50	27.32	18.544
Household time off-farm (%)	0.00	68.60	13.12	12.417
Equivalised household size	1.00	4.80	2.14	0.719
Total cultivated land area (ha)	0.01	132.00	8.26	13.100
Size of biggest plot (ha)	0.01	67.00	2.73	4.956
Distance to biggest plot (km)	0.00	45.00	2.40	3.372
Distance to most distant plot (km)	0.00	45.00	3.68	4.724
Distance to nearest urban centre (hrs)	0.00	1.50	0.43	0.335
Share of sales in output (%)	0.00	100.00	52.16	32.197
Subsistence production contribution to total income (%)	0.00	80.42	21.77	17.979
Share of food consumption from own production (%)	0.00	99.00	45.65	26.139
Equivalised income per capita				
- excluding subsistence production (PPP€)	323	52,264	8,253	6876.386
- including subsistence production (PPP€)	640	68,626	10,243	7629.083

Source: SCARLED database. Sample of 616 observations.

[6] The data did not allow computing a weighted average for livestock products, as only the average weight and the average price per head were reported, and not the quantities sold. For this reason, when a village/regional livestock price was calculated it was a simple arithmetic average.

[7] For the PPP exchange rates used here, refer to: http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/metadata?p_product_code=PRC_PPP_ESMS (13-07-2010)

Table 4 indicates that farmers in the five NMS are relatively old. On average households (combining the time allocation of all household members who have indicated some work time) spend more time on- than off-farm which could be expected for agricultural households.

The mean household is small with an equivalised size of 2.1 members. The mean cultivated area is also small, 8.3 ha, but the distribution is positively skewed; the size of the largest land area is well over 100 ha.

On average, the sample households sell half of their agricultural output, which places them at the margin between semi-subsistence and commercially oriented, but households who do not sell any output (pure subsistence production) are also present in this sample. Home produced food covers a substantial part of food consumption, nearly 46 per cent on average. The contribution of subsistence production to household income is just below 22 per cent. However, these observations refer to the sample mean. The minimum and maximum indicate extreme cases of almost full dependence on subsistence farming, or conversely, of a lack of any reliance on subsistence.

The mean household income per capita, with and without the valuation of subsistence production, is less than 10,250 (PPP€) per annum. It should be noted that the standard deviation of household income is large, and both the mean and standard deviation increase with the valuation of the unsold output and the income distribution is right skewed. At first glance, the location characteristics, represented by the distance to the nearest urban centre, here measured in hours to capture the effect of poor or inadequate transport infrastructure do not suggest remoteness, but some households might find that distance acts as an impediment to reach buyers and wholesale markets as they may need to add up to 3 hours travel to and back from the nearest urban centre.

5. Analytical results

5. 1. Contribution of subsistence farming to agricultural household incomes

To better understand the role of subsistence farming in NMS it is important to analyse its contribution to topping-up household cash incomes which could potentially contribute to reducing rural poverty rates. In a case study of Romania, Petrovici and Gorton (2005) show that the assessment of poverty rates is sensitive to the inclusion of subsistence production. Consequently, the role of subsistence farming as a means to alleviate poverty in the NMS needs to be assessed and considered in the design of policies aimed at commercialisation of subsistence farmers.

As explained in the previous section, the unsold output (subsistence production) was valued at market prices, household by household. This value was then added to household cash incomes, generating a total household income made up of both cash incomes and the market value of subsistence production. Table 5 shows the effect of this valuation in shifting households from below to above the poverty line.[8]

Table 5. Household distribution below the poverty line by country with and without the value of subsistence production, 2006 (%)

	Bulgaria	Hungary	Poland	Romania	Slovenia	Sample total
- Below the poverty line excl. subsistence production	20.2	11.8	10.0	3.6	24.6	13.3
- Below the poverty line incl. subsistence production	7.1	7.1	2.1	1.2	16.2	6.5
- Shifted above the poverty line	13.1	4.7	7.9	2.4	8.5	6.8

Source: SCARLED data base, subsample of 616 observations

[8] As outlined in the methodology section, the poverty line refers to the Eurostat at-the-risk-of-poverty threshold, below which households were defined as poor. This threshold corresponds to 60 per cent of the national equivalised median income. The at-the-risk-of-poverty thresholds per capita were in 2006: Bulgaria €1022, Hungary €2308, Poland €1867, Romania €828 and Slovenia €5589.

The table shows that for the sample as a whole, the valuation of subsistence production pushes nearly 7 per cent of the sample above the poverty line. The impact of subsistence production for moving households above the poverty line is strongest in one of the poorest NMS, Bulgaria, but also has a large impact on poverty rates in Slovenia, one of the richest NMS. However, as the assessment refers to relative poverty rates, this does not mean that Bulgarian and Slovenian households are the poorest in absolute terms. It only means that a higher share of rural households in Slovenia and Bulgaria are poor relative to in the other NMS. This also explains why Romania, another poor NMS, has the lowest share of households below the poverty line. Poverty rates should therefore be treated with caution.

For this reason, the contribution of subsistence production to total household cash income was considered as a complementary indicator of the importance of subsistence farming as a safety net in the NMS (Table 6).

Table 6. Subsistence production contribution to total household income by group of households and by country, 2006 (%)

	Bulgaria	Hungary	Poland	Romania	Slovenia	Sample mean
- Below the poverty line	28.9	18.5	22.1	43.0	18.2	21.4
- Shifted from below to above the poverty line	47.7	21.7	45.4	54.7	31.9	40.8
- Above the poverty line	25.6	4.5	21.7	32.1	9.0	20.3

Source: SCARLED data base, subsample of 616 observations

The contribution of subsistence production to total incomes is uneven but significant: there are large variations in the contribution of subsistence production to total household incomes, both across countries and across the three household categories (households always below the poverty line, even after including the value of subsistence production; households who were shifted from below to above the poverty line when the value of subsistence production was added to the cash incomes and households who were always above the poverty even before the valuation of subsistence production). Only for households above the poverty line in Hungary and Slovenia does subsistence production contribute very little to total incomes. Moreover, subsistence production was found to be of particular importance for poor households in remote locations. Such households are fairly reliant on agriculture for their livelihoods but possess insufficiently large farms to generate high incomes. The fortunes of this group will therefore be closely linked to social security systems, and to whether or not the non-farm rural economy expands to provide alternative occupations in remote rural locations.

5.2. What differentiates subsistence from commercial farmers?

The survey responses suggest that the stated aims of the majority of respondents regarding their farming activities are both to provide food for the household (50.5 per cent totally agreed) and to generate cash income (40.4 per cent totally agreed) (Table 7). These attitudes reflect both subsistence objectives (providing food for the household) as well as commercially oriented intents (generating cash income). However, to differing degrees, farmers might also enjoy the non-pecuniary benefits of farming. In this regard, 24.2 per cent of respondents totally agreed with the statement that their aim in agriculture was to “Enjoy farming”, and also 24.2 per cent totally agreed with the statement “We only produce for the provision of safe food for the household” and 18.0 per cent totally disagreed with the statement “We produce for pecuniary reasons”. They might indicate the emergence of a group of hobby farmers in NMS, a relatively important phenomenon in the EU-15.

Table 7. Aims regarding farming activities (% of the sample)

	Totally disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Totally agree	Total
To provide food for the household	5.8	5.4	6.8	31.5	50.5	100
To provide work for household members	17.0	14.0	17.5	32.8	18.7	100
To transfer to the next generation	14.6	10.6	26.0	24.5	24.4	100
To enjoy farming	7.8	8.9	25.6	33.4	24.2	100
To generate cash income	9.9	6.8	12.8	30.0	40.4	100
We only produce for the provision of safe food for the household	14.0	18.0	15.7	28.1	24.2	100
We produce for pecuniary reasons	18.0	14.0	19.0	25.0	24.0	100

Source: SCARLED database, subsample of 616 observations.

Concerning the respondents' perceptions about the barriers to commercialisation they face, the survey suggests that they are influenced by market prices, and higher output prices and policy support are the factors most likely to facilitate further market integration. More than half of the respondents perceive that the prices they receive are low and that this is their main barrier to increase production and sales. Consistently, they totally agree that in order to increase the degree of commercialisation "Agricultural prices would need to be higher" and that they "Would need (higher) policy payments to agriculture and rural development". The latter indirectly presents the respondents as CAP supporters. Insufficient capital, their own old age and health problems are other important barriers to commercialisation perceived by respondents.

However, it is difficult to provide a more general overview based on the initial variables. To summarise this information factor analysis was employed in order to help condensing the information contained in this very large set of variables into relatively few common factors. Since factor analysis is used to summarise a large number of data variables into factors that describe the statistical association between each variable without loss of information, and can assign scores to individuals for each factor, this approach is particularly useful here.

The factor analysis generated six factors, explaining 65 per cent of the variance. The rotated component matrix summarising the factors is presented in Table 8 and the full list of statements considered for the factor analysis is presented in Appendix 1 to this paper. The KMO measure of sampling adequacy was 0.84, indicating that the data matrix had sufficient correlation to justify the use of factor analysis. Bartlett's test of sphericity was statistically significant at 1 per cent level, rejecting the null hypothesis that the correlation matrix was an identity matrix.

The first factor is labelled "Barriers to commercialisation" as it appears to summarise variables which describe farmer perceptions of potential barriers to commercialisation, including investment, training, farmers' collaboration, and contracts with buyers. The second factor, "Information and skills constraints" is associated with perceptions of a mix of imperfect information and a lack of skills that form barriers to market integration. The third factor groups together variables which describe the importance of low commodity prices and policy payments as barriers to commercialisation, hence "Market and policy barriers to commercialisation". The fourth factor "Financial farming objectives" depicts an association between two financial objectives, namely the generation of cash income and the preference for the non-pecuniary aims in farming. The fifth factor describes an association in the responses of farmers to constrained availability of capital and low market prices as barriers to increase production (which is not necessarily synonymous to increase sales, as in the third factor), and the factor is consequently named "Financial constraints to increase production". The last factor shows a strong association between the variables which describe two aims for agricultural activity "To enjoy farming" and "To transfer to the next generation". As such, this last factor could be labelled as "Farming Lifestyle".

Table 8. Rotated component matrix

	Barriers to commercial-isation	Information and skills constraints	Market and policy barriers	Financial farming objectives	Financial constraints to increase production	Farming lifestyle objectives
– We would need to invest in new machinery	**.799**	.000	.077	-.089	.028	-.003
– We would need credit	**.797**	-.039	-.061	-.122	.079	.025
– We would need training in marketing	**.767**	.016	.045	.107	-.062	.091
– We would need advice on how to meet buyers' quality standards and how to comply with public regulations	**.727**	.103	.213	.166	-.105	.048
– We would need to collaborate with other households or farms to collectively market output	**.681**	-.032	.189	-.062	.157	.054
– Market and transport infrastructure would need to be improved	**.662**	.139	.327	.139	-.110	.008
– We would need to specialise production into fewer products	**.633**	-.036	.181	-.055	-.029	.090
– We would need contracts with buyers	**.603**	.030	.355	-.069	.062	-.029
– We lack necessary skills and education	-.061	**.806**	.029	-.083	.004	.069
– We cannot meet standards of buyers or public regulations	.058	**.779**	.092	-.040	.132	-.006
– We lack information and advice on market prices	.055	**.771**	-.057	.121	.119	.026
– We would need (higher) policy payments to agriculture and rural development	.377	-.002	**.767**	.055	-.020	.013
– Agricultural market prices would need to be higher	.315	.052	**.749**	-.045	.081	.048
– We produce for pecuniary reasons	.003	-.067	-.093	**.867**	-.049	-.031
– To generate cash income	-.045	.069	.119	**.765**	.157	.287
– We lack capital	.103	.202	-.147	-.082	**.817**	-.019
– We receive low prices for agricultural output	-.088	.077	.223	.176	**.805**	.084
– To enjoy farming	.101	.032	.028	.016	-.117	**.849**
– To transfer to the next generation	.072	.051	.016	.166	.183	**.764**

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser normalisation. Rotation converged in 6 iterations.

Since the factor scores generated by the factor analysis were able to summarise the information contained in the included variables they could be used in subsequent analysis. The next stage was to carry out a latent class regression analysis to allow for heterogeneity of determinants of household market integration. The individual factor scores were included together with additional variables that were selected based on the theory of farmers decision-making and/or previous studies in order to explain market participation as measured by the share of own produce sold. The preferred model is presented in Table 9 below.

Table 9. Regression results for subsistence and commercial classes

Dependent Variable: Share of own produce sold	Class 1 Subsistence oriented	Class 2 Commercially oriented	p-value	p-value (=)
Intercept	13.255	95.510	0.000	0.000
Barriers to commercialisation	2.618	-0.178	0.035	0.020
Information and skills constraints	-5.852	-0.558	0.000	0.000
Market and policy barriers to commercialisation	-5.959	0.226	0.000	0.000
Financial objectives	8.647	2.280	0.000	0.003
Household off-farm time-allocation (%)	-0.246	0.000	0.025	0.025
Equivalised household size	3.340	-2.078	0.030	0.009
Cultivated land area (ha)	0.378	0.073	0.001	0.003
Distance to nearest urban centre (hrs)	-8.378	-8.378	0.001	.
Non-manual farming technology	28.444	4.130	0.000	0.002
R^2	0.341	0.345		
Class Size (% of total sample)	80.2	19.8		
Mean share of own produce sold (%)	40.2	93.6		

Source: Latent GOLD® regression output of 616 observations.

The above model was selected as compared to a standard 1-class linear regression model and a 3-class latent class model, as the 2-class model presented the lowest BIC-value. In comparison to the 1-class model, the R^2 also increases from 0.271 to 0.341 and 0.345 for the two classes respectively. The selected model contains two restrictions compared to the more parsimonious (unrestricted) 2-class model, in which household off-farm time allocation was close to zero for Class 2 and the distance to nearest urban centre was not statistically different between the two classes. Imposing the restriction of no effect of household off-farm time allocation for Class 2 and class independence of distance to nearest urban centre, resulted in a better fit of the model, as indicated by a lower BIC-statistic and verified by a log-likelihood ratio test.

The effect of each explanatory variable on the dependent variable - share of own produce sold- is reported by class. For each explanatory variable, the first reported p-value indicates the statistical significance of parameters being different from zero, while the p-value (=) indicates the statistical significance of parameters being different between classes. As noted the above model contains a restriction of class independence for the variable distance to nearest urban centre, why no p-value is reported for this parameter. All p-values are below 0.050 which means that all parameter coefficients are statistically significant at the 5 per cent level.

The first observation to be made with respect to the above model, is that factors four and five, "Financial constraints to increase production" and "Farming lifestyle" did not enter the preferred model as they were not statistically significant. Moreover, a few variables which according to theory and previous studies could explain the share of own produce sold were not statistically significant. These referred to age and age squared of the household head, as indicators of the household lifecycle and experience. It was also expected that land dispersion would impact negatively on sales through increasing internal transactions costs, but the survey variables of size of biggest plot, and the distances to the biggest and most distant plots were not statistically significant.

As can be seen from the presented regression output, Class 1 is the larger of the two making up 80 per cent of the sample. The average sales (dependent variable) for this class are 40.2 per cent, meaning that these households produce mainly for their own needs (food or inputs in production). Subsistence production is hence important for this class. This is supported by the descriptive statistics presented in Table 10, which show that nearly half of the food consumed by these households comes from their own production and subsistence production valued at market prices constitutes an important share of total household incomes (26.5 per cent). For these reasons, this class is labelled "Subsistence oriented". Members of Class 2 on the other hand, sell 93.6 per cent of their output. A third of the food

they consume is their own production and the value of subsistence production only corresponds to 5.3 per cent of total household income. Consequently, this class is labelled "Commercially oriented".

The explanatory variables "Barriers" and "Market and policy barriers to commercialisation" show opposite signs between and within classes. A negative effect on sales indicates that households perceive that their current market participation is constrained and because of this agree that they would be able to sell more if they could overcome these barriers. This is the case of the subsistence class with respect to "Market and policy barriers" and the commercial class regarding "Barriers to commercialisation" although the latter effect is small. Consider therefore the subsistence class; many of its members would be too small to have been eligible for policy support (mainly the single area payment) as opposed to the larger commercial holdings. Moreover, the quantities sold might be too low to make their produce attractive to buyers and hence they receive low prices, making them feel constrained by a lack of policy support and by low market prices. Alternatively, these farmers are simply producing at higher cost, possibly because of diseconomies of scale, and therefore require higher prices for output in order to make profit from sales. The interpretation of a positive impact on sales of the two barrier factors is less straightforward. Consider first the positive impact of "Barriers to commercialisation" on sales for the subsistence class. Their generally low market participation (sales of 40.2 per cent of production) suggests that households who sell nothing or very little, might not have experienced these barriers while households in the same class who are more market integrated are aware of these barriers and consequently agree more with the proposed statements. The same logic applies to the positive impact of "Market and policy facilitators" on sales for the commercial class, i.e. commercial households who sell more, are more positive about the effect of policy support and higher market prices, compared to commercial households who sell less. This might be down to the fact that households who sell more might have benefitted from these actions in the past, although the data is cross-sectional and hence any interpretation regarding causality should be treated with caution. Recall also that although there is not enough heterogeneity in the sample to produce further homogeneous groups based on the set of explanatory variables, some heterogeneity within groups is still to be expected, as suggested by these results.

As for the skills and information barriers, the effect is as expected negative for both classes although the subsistence class appears much more constrained by this than the commercial class. The fourth and final factor included in the regression analysis refers to the financial objectives for farming, which has a stronger positive impact on sales for the subsistence oriented class. A likely explanation for this could be the income diversification of households, where subsistence households are more agricultural as indicated by the household time allocations to on- and off-farm work respectively (Table 10). Income from agricultural sales is therefore more important for these households relative to the commercial ones, who are more diversified towards work off-farm.

The effect of off-farm employment on sales is another aspect of income diversification. Interestingly for the commercial class, allocating more time to off-farm work has no effect on sales while the impact is negative for the subsistence class. This finding evokes the issue of separability between household consumption and production decisions. Singh *et al.* (1986) were first to show that differing sales and purchase prices for commodities or labour, which can be due to commodity heterogeneity or transactions costs, causes interdependency of household consumption and production decisions. With specific reference to the labour market, two general causes of non-separability are i) market imperfections giving rise to transactions costs causing constraints on hiring-in labour or working off-farm; and ii) differences in the efficiency of family and hired labour causing the household to value the two sources of labour differently (Benjamin, 1992). Separability is formally assessed through separability tests (e.g. Benjamin, 1992; Jacoby, 1993; Vakis *et al.*, 2004). Although the data did not allow testing for separability, the effect of off-farm employment on sales is indicative of separability for the commercial class as the result suggest that (skilled) household labour working off-farm can be freely substituted by hiring-in (unskilled) labour for on-farm work (Benjamin, 1992). The observation that off-farm work is negatively correlated with sales for the subsistence class could indicate non-separability, yet this would need to be ascertained through a separability test. Nevertheless, the economic literature offers different explanations to this effect. Barret *et al.* (2000) find that households with insufficient productive assets (land and livestock) to make full use of household labour endowment, have a greater need to seek out off-farm employment in the presence of malfunctioning land and livestock markets. Another cause of income diversification into off-farm

wage employment is low farm income paired with surplus family labour (Woldenhanna and Oskam, 2001). Yet another, perhaps complementary explanation, lies in farming efficiency. Goodwin and Mishra (2004), analyse the relationship between farming efficiency and off-farm labour supply, confirming an inverse relationship where a higher involvement in off-farm employment is associated with lower farming efficiency. Inversely, more efficient farmers are less likely to work off farm, a finding also reached by Latruffe *et al.* (2004) who establish that more market integrated farms are also more efficient.

The effects of the production factors labour (equivalised household size) and land (cultivated land area), together with production technology, differ between the classes. The effects of acquiring more land, and notably switching from manual to non-manual farming techniques (draft animals and/or mechanical farming technologies) are as expected much larger for the subsistence oriented class in comparison to the commercial. However, the effect of equivalised household size differs in both magnitude and signs between the two classes. Recall that having a larger household can have two important effects: i) a consumption effect (more mouths to feed); and ii) an income effect, due to an increase in a productive asset – labour – to allocate to either on- or off-farm work. The effect of equivalised household size has a positive effect on sales for the subsistence class, which indicates that the income effect is larger than the consumption effect, as larger households can produce more for the market and less for subsistence needs. This could be down to an increase in on-farm labour supply and higher production levels, or conversely, to income generated from increased off-farm work meaning that less produce needs to be retained for subsistence needs. A simple correlation analysis of the variables equivalised household size and off-farm time allocation suggests that the second effect dominates in this case, as the larger the household, the more time is allocated to off-farm work. The effect for the commercial households is the opposite: larger households sell less. This could be due to either a higher reliance on subsistence production and consequently lower sales for larger households (consumption effect), or conversely to income diversification in favour of off-farm work increasing with household size (income effect). The correlation analysis suggests that the consumption effect dominates here, as a positive relationship between household size and the share of produce retained for own consumption is revealed, while there is no correlation between household size and time-allocation to on- and off-farm work. Yet, gaining an understanding of the exact mechanisms behind the observed effects, requires a more in-depth analysis of household demographics, individual skills and its impact on livelihood strategies, which is beyond the scope of this paper.

Remoteness, measured by the travel time (in hours) to the nearest urban centre, has a large, negative impact on sales, and does not differ between classes. This effect is expected as access to markets for both outputs and inputs in production, consumption goods as well as to off-farm labour markets, decreases with distance (e.g. Brüntrup and Heidhues, 2002; Von Braun and Lohlein, 2003).

As a complement to the regression analysis, the descriptive statistics presented in Table 10 show that the commercial class enjoys higher incomes than the subsistence class, which is likely to be a combination of higher sales and higher incomes from off-farm work. The value of subsistence production is not enough to put the households in the subsistence class at par with the incomes of the commercially oriented households.

On a final note, the size of the biggest plot and the distances to the biggest and most distant plots, are all indicators of land fragmentation. High land fragmentation means higher internal production costs, and policies aimed at land consolidation are argued to benefit commercialisation through lowering these costs. The distances to plots are likely to increase with farm size (ha), why it is interesting to observe that the distances to plots does not differ a lot between the subsistence and the commercial class. This, together with the biggest plots of subsistence oriented households being on average 1.8 ha smaller than the commercial one's, suggests a relatively higher land fragmentation for subsistence oriented households.

Table 10. Descriptive statistics, means by class membership

	Class 1 Subsistence oriented N = 478	Class 2 Commercially oriented N = 138
Age of household head	55.35	52.69
Household time on-farm (%)*	28.19	24.34
Household time off-farm (%)*	12.57	15.00
Equivalised household size	2.10	2.28
Total cultivated land area (ha)	7.47	10.97
Size of biggest plot (ha)	2.34	4.12
Distance to biggest plot (km)	2.44	2.25
Distance to most distant plot (km)	3.64	3.80
Distance to nearest urban centre (hrs)	0.44	0.38
Subsistence production contribution to total income (%)	26.53	5.28
Share of food consumption from own production (%)	49.16	32.92
Equivalised income per capita		
- excluding subsistence production (PPP€)	7,283	11,615
- including subsistence production (PPP€)	9,675	12,209

* Household time allocation was based on a 16 hour day (24 hours and deducting 8 hours of sleep), 365 days per year. For example, in Bulgaria, an Annual Working Unit (AWU)[9] corresponds to 1856 hours per year, i.e. 8 hours per day and 232 days per year. The time-allocation to on-farm work for a person fully employed in agriculture is consequently 1856/(16*365) = 32 per cent per year, with the remaining 68 per cent being allocated to leisure (which includes evenings, weekends, and holidays). However, not all household members doing work on- and off-farm are working full-time, e.g. some household members may work only during school holidays and older members of the household might only do some on-farm work for as little as a couple of hours per week.

Source: SCARLED database, subsample of 616 observations

The above analysis does not reveal what individual barriers constitute the biggest obstacles to commercialisation for the two classes. To gain an understanding of this, and to get an idea of what actions are most requested to facilitate commercialisation, Likert-scale responses for the four constraining factors are presented in Table 11.

Investing in new machinery is perceived as beneficial for commercialisation by a vast majority of both subsistence and commercially oriented households, but this requires capital which households in both classes state that they are lacking (subsistence oriented households more so than commercial ones). More than half of households in both classes believe that improvements in market and transport infrastructure, as well as establishing contracts, would facilitate their market integration. These two actions are examples of ways to reduce transactions costs, which according to economic literature favours commercialisation (e.g. Goetz, 1992; Omamo, 1998; Key *et al.*, 2000).

Another way of reducing transactions costs is through cooperation. This also strengthens the bargaining power, which, in turn, can help farmers to receive higher prices for their output and may also facilitate to negotiate contracts. However, around a third of households in each class disagree with the statement that cooperation to collectively market output would benefit their increased commercialisation. A possible explanation for this is that cooperation has a negative connotation for many people as a consequence of the legacy of socialist regimes (Chloupkova *et al.*, 2003; Gardner and Lerman, 2006; Forgacs, 2010). Interestingly, subsistence oriented farmers who potentially have a lot to gain from cooperation are less positive about the effect this might have on their market integration compared to the commercial class. This indicates that the benefits of cooperating to increase sales become more apparent as market integration increases, which finds support in a recent case study of cooperation among Polish farmers (Wołek and Łopaciuk-Gonczaryk, 2010). The study reveals that small farmers rarely enter into formal cooperation. Instead, cooperation among small farmers is mainly informal with the main objective being to offset their lack of capital and improve

[9] The annual work unit corresponds to the work performed by one person who is occupied with an agricultural holding on a full-time basis. "Full-time" means the minimum hours of work required by the national provisions governing contracts of employment. If these do not indicate the number of hours, then 1800 hours (225 working days of 8 hours each) is assumed. http://circa.europa.eu/irc/dsis/coded/info/data/coded/en/gl009928.htm (09-07-2010).

Table 11. Likert-scale distributions of factored barrier variables, by class.

	Class 1 Subsistence oriented			Class 2 Commercially oriented		
	Disagree	Neither agree or disagree	Agree	Disagree	Neither agree or disagree	Agree
Barriers to commercialisation						
– We would need to invest in new machinery	29.9	9.4	60.7	18.8	11.6	69.6
– We would need credit	37.7	19.9	42.5	39.1	15.2	45.7
– We would need training in marketing	39.7	22.2	38.1	39.9	22.5	37.7
– We would need advice on how to meet buyers' quality standards and how to comply with public regulations	37.9	17.8	44.4	37.7	21.7	40.6
– We would need to collaborate with other households or farms to collectively market output	34.9	26.6	38.5	30.4	19.6	50.0
– Market and transport infrastructure would need to be improved	27.0	20.3	52.7	23.9	24.6	51.4
– We would need to specialise production into fewer products	37.0	25.3	37.7	34.1	18.8	47.1
– We would need contracts with buyers	27.0	21.8	51.3	26.8	20.3	52.9
Information and skills constraints						
– We lack necessary skills and education	56.9	24.5	18.6	63.0	19.6	17.4
– We cannot meet standards of buyers or public regulations	47.3	32.8	19.9	64.5	23.2	12.3
– We lack information and advice on market prices	42.7	30.1	27.2	52.9	23.2	23.9
Market and policy barriers to commercialisation						
– We would need (higher) policy payments to agriculture and rural development	14.4	9.8	75.7	11.6	8.7	79.7
– Agricultural market prices would need to be higher	10.5	5.6	83.9	10.1	5.1	84.8
Financial constraints to increase production						
– We lack capital	18.2	16.1	65.7	24.6	23.9	51.4
– We receive low prices for agricultural output	10.7	10.7	78.7	12.3	13.0	74.6

The Likert-scale responses have been simplified for presentation purposes. Alternatives 1 – "Totally agree" and 2 – "Somewhat agree" are summarised under "Disagree" and alternatives 4 – "Somewhat agree" and 5 – "Totally agree" are combined under "Agree".

Source: SCARLED database, subsample of 616 observations.

access to machinery, and not to decrease their market disadvantages and increase sales. Also in line with the regression results, the case study reveals that the majority of Polish formal producer organisations are established in regions where the agricultural sector is characterized by a higher share of larger and more commercial farms. In regions with a predominance of small farms, formal co-operation has been less wide-spread. As pointed out by Millns and Juhasz (2006), this poses a problem

for commercialisation of small farmers as informal groups do not provide the long term stability and confidence of formal groups, which is likely to send negative signals to all involved: members, suppliers and financial institutions as well as to customers. Moreover, many buyers and suppliers are not able to enter into commercial negotiations and to establish contracts with groups that are not formalised.

Specialisation appears to become increasingly important with sales, as the commercial class agree more with the statement "We would need to specialise production into fewer products". This is expected, as the subsistence class require a wider product range to satisfy their own food needs whereas the commercial households are less reliant on producing their own food. As regards "Information and skills constraints", market integration does not appear to be constrained by these for a majority of households. Still, there are important shares of households in both classes who feel that their commercialisation would benefit from acquisition of adequate skills and information. Regarding "Market and policy barriers", the two classes are quite similar in their attitudes and put a lot of faith in the beneficial effects of policy payments and higher market prices.

6. Commercialisation of subsistence farmers: policy discussion

The analysis presented in this paper depicts a dual farm structure where only a fifth of the sample of farms fit the notion of commercial holdings, and the majority of farms are small, predominantly subsistence oriented operations. For many of the latter households, subsistence production constitutes an important safety net and the valuation of subsistence production has a significant impact on reducing the real poverty these households face. The contribution of subsistence production to total incomes is of particular importance in the poorest NMS, Bulgaria and Romania. However, the results of the first part of the analysis also suggest that some of the subsistence oriented households may farm, not out of necessity but out of choice. These households use their endowment of land to both enjoy farming itself and the consumption of food they have produced for themselves.

Methodologically, where previous studies normally divide households into subsistence and commercial based on an arbitrary threshold of market participation, economic size or productive assets, the use of latent class regression applied in this study represents a more objective way to analyse heterogeneity as the determinant of class membership (subsistence or commercial) is not pre-defined. Each latent class has its own regression parameters and each household has a probability of belonging to each of the latent classes. Class membership probabilities are estimated directly from the model parameters and used to assign each household to the class for which the posterior probability is the highest. The latent class regression analysis in this paper provides evidence of two classes – one subsistence and one commercially oriented – who differ in behaviour with respect to the set of explanatory variables.

In the economic literature, there has been a large focus on the impact of transactions costs as barriers to commercialisation for subsistence farmers in many areas of the world. For example, in a case study of Romanian farmers, Balint and Wobst (2006) conclude that high transaction costs in input and output markets act as impediments to market participation, whereas Fafchamps and Hill (2005) find that poor farmers are more likely to sell at local spot markets while farmers of both intermediate and high wealth are more likely to sell to traders directly. A number of transactions costs are related to access to markets. The regression analysis shows that remoteness, measured as distance to nearest urban centre in travel time, has a relatively large and negative impact on the proportion of own produce sold for both commercial and subsistence classes. Improvements in infrastructure would help to lower transport costs of accessing markets and could improve the position of many remote farm households. This is also reflected in the attitudes of respondents. The majority of both subsistence and commercially oriented households agree that improved transport infrastructure would benefit them by allowing them to increase their market integration. Although a quantification of actual transactions costs was not possible here, the analysis of households' perceptions of barriers and constraints to commercialisation does indicate that transactions costs are an important determinant of market integration for both subsistence and commercially oriented operations.

The latent class regression analysis shows that perceptions of constraints comprised in the factors "Barriers to commercialisation", "Market and policy barriers to commercialisation" and "Information

and knowledge constraints" appear to be strongly associated with the households' level of market integration for the subsistence class. Households in the subsistence class who feel constrained by a lack of policy support, by low market prices, and by a lack of adequate skills and market information, sell less of their produce relative to other households in the same class. Although the impact of "Barriers to commercialisation" on sales is positive, this does not mean that subsistence oriented households are not constrained by the issues comprised in this factor. What it appears to suggest is that as market integration increases, households become more aware of the existence of these barriers to market participation. This highlights the need to raise awareness amongst subsistence farmers who want to commercialise about the obstacles they are likely to face in the process, before they embark on it. This activity has the potential to help the process of integration of subsistence households by allowing them to manage their expectations of the likely benefits of market engagement at an early phase when marginal transactions costs are likely to be high but falling. Providing information on how transactions costs can fall with increased market engagement could help to prevent households from falling back into a subsistence-trap which could appear to them as a local, but not global, optima.

Receiving low prices and lacking contracts with buyers are two seemingly important impediments for the further commercialisation of both classes of farm households. In this respect, farm households might benefit from cooperation with others to collectively market output, as this is likely to reduce average transactions costs (e.g. Sadoulet *et al.*, 1996; Holloway *et al.*, 2000; Shiferaw *et al.*, 2008). In addition, collaboration can also increase the prices received by farmers as this strengthens bargaining power with buyers and suppliers. However, not all farmers are positive about the potential benefits of cooperation which might be explained by the experiences of cooperatives dating back to the socialist (Chloupkova *et al.*, 2003; Gardner and Lerman, 2006; Forgacs, 2010). Commercially oriented holdings are more positive about the benefits of cooperation for increasing market integration in comparison to the subsistence class, and are also more prone to enter into formal cooperation (Wołek and Łopaciuk-Gonczaryk, 2010). Cooperation among small farmers is mainly informal with the aim to offset a lack of capital and to improve access to machinery, and not overcome market disadvantages and increase sales. The benefits of informal cooperation for commercialisation are questionable, since informal groups do not provide the long term stability and confidence of formal groups (Millns and Juhasz, 2006). Moreover, many buyers and suppliers are not able to enter into commercial negotiations and to establish contracts with groups that are not formalised. Consequently, the Rural Development (RD) measure of setting up of producer groups is indeed relevant, although farmers who would potentially benefit most from this measure, may be reluctant to pick up on this opportunity. One way to encourage farmers to set up producer groups, would be to provide model examples on a country or regional level, for example through promoting a selection of successful 21st century cooperatives and by drawing on experiences from other projects, such as Leader+, aimed at increasing social networking and the forming of partnerships which may extend outside of a producer group.

The effect of employing non-manual farming technology (draft animals and/or agricultural machinery) is positive for market integration, and the effect is very large for the subsistence class. In line with this, investing in new machinery is perceived by a majority of both subsistence and commercial farmers as beneficial to increasing sales. This work has not considered the important question on rates of return on such investment which each farmer must consider in respect of equipment investment opportunities and we make no claim about the appropriateness of increased mechanisation here. Indeed, we would expect that the relatively low opportunity cost of labour on these farms and in these regions would suggest that significant further mechanisation would be unproductive at this stage. However, half of the households in the commercial class and as many as two thirds in the subsistence class, experience a general lack of credit. This might partially explain why more than 75 per cent of respondents of both classes are positive about the potential benefits of increased policy support. While larger commercial farms in the NMS may benefit from the Single Area Payment Scheme (SAPS) under CAP Pillar 1,[10] Pillar 2 support within the RD Policy Framework is available in the form of farm modernisation measures and support to (semi-)subsistence farms undergoing restructuring. While most NMS do not impose specific size thresholds for access to

[10] From 2010 onwards the minimum size of eligible area as 1 ha or a minimum amount for payments of €100, with some discretion for Member States to adapt the thresholds in function of their farm structure.

the modernisation measure, [11] to receive financial support, farmers must contribute towards the required investment themselves and also submit a business plan. This might constitute an obstacle for small holdings who may struggle to demonstrate the economic viability of any investments, or to access credit for the private contribution required. The same applies to the financial support available to (semi-)subsistence farms undergoing restructuring, which also aims towards financially viable operations. The support corresponds to a flat rate of €1500 per year for a maximum of five years in NMS which have adopted this measure, and eligibility for support may be subject to thresholds.[12] Although not designed as investment but income support, in theory it can still alleviate some liquidity constraints in the production process. However evidence from some NMS (Forgacs, 2010) indicates very little uptake of this measure.

Finally, the effects on sales of off-farm time-allocation and equivalised household size differ between classes. Even though the parameters are statistically significant and different between the subsistence and commercial classes, the underlying causes are difficult to explain. The time-allocation effect is indicative of separability/non-separability issues (e.g. Singh *et al.*, 1986; Benjamin, 1992), although this needs to be formally assessed through separability tests. However, if this is the case, this has potentially important policy implications as non-separability of production and consumption decisions implies that households may not respond as expected to market signals. To understand the mechanisms behind the opposite effects of equivalised household size between the two classes, requires a more in-depth analysis of decisive factors such as household composition, individual skills and household decision making, possibly within a livelihood strategy framework, which was beyond the scope of this paper.

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[11] Three of the NMS studied in this paper apply thresholds for access to this measure: Bulgaria 1 ESU, Romania 2 ESU and Poland 4 ESU.

[12] The following eligibility criteria apply in the SCARLED NMS who have adopted this measure: Bulgaria 1-4 ESU, Hungary 2-4 ESU and Romania 2-8 ESU.

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Appendix 1. Statements included in the questionnaire and variables extracted in factor analysis*

Current aims for agricultural activity
To provide food for the household
To provide work for household members
To transfer to the next generation
To enjoy farming
To generate cash income
Perceptions about current agricultural activity
We have good profitability
We fully employ household members
We only produce for the provision of safe food for the household
We produce for pecuniary reasons
We get satisfactory income from current sales
Perceptions about barriers to increase production
We lack capital
We receive low prices for agricultural output
We lack necessary skills and education
We lack information and advice on market prices
We cannot meet standards of buyers or public regulations
Market and transport infrastructure prevent us from selling our products
Age/health prevent us from producing more than we currently do
Perceptions about barriers to increased commercialisation
Agricultural market prices would need to be higher
We would need more land
We would need to specialise production into fewer products
We would need to invest in new machinery
We would need credit
We would need to collaborate with other households or farms to collectively market output
Market and transport infrastructure would need to be improved
We would need advice on how to meet buyers' quality standards and how to comply with public regulations
We would need training in marketing
We would need contracts with buyers
We would need (higher) policy payments to agriculture and rural development

* The table lists all statement variables considered. Variables entering the final factor analysis are highlighted in bold. The remaining un-emboldened variables had low factor loadings (below the cut-off point of 0.5) and were excluded from further analysis.