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Comparative analysis of the contribution of subsistence production to household incomes in five EU New Member States: Lessons learnt

Sophia DAVIDOVA*, Lena FREDRIKSSON*, Matthew GORTON**, Plamen MISHEV*** and Dan PETROVICI*

*University of Kent, Department of Economics; **University of Newcastle, School of Agriculture, Food and Rural Development and *** University of National and World Economy (UNWE)

s.davidova@imperial.ac.uk, lef8@kent.ac.uk, matthew.gorton@newcastle.ac.uk, mishevp@intech.bg & d.a.petrovici@kent.ac.uk

Abstract

Drawing on primary survey data, this paper assesses the importance of subsistence agriculture in five new Member States of the European Union (EU). The value of subsistence production to agricultural households is evaluated, particularly regarding its impact on assessments of poverty and vulnerability. The analysis indicates that the contribution of subsistence farming to household incomes is of utmost importance for the rural poor, particularly in Bulgaria and Romania. In Romania for poor households, the value of subsistence production accounts for more than 50% of per capita real incomes. The application of factor and cluster analysis reveals four types of agricultural households which differ significantly in terms of the importance of subsistence production. Older, dependent households characterise the largest cluster (46% of the sample). This cluster is predominately subsistence oriented and, on average, subsistence production accounts for approximately 19% of their real household incomes. Significant subsistence production is likely to persist in the short to medium term.

Keywords: agricultural households, subsistence, commercialization, incomes

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1 Introduction[1]

Twenty years after the downfall of socialist regimes in Central and Eastern Europe (CEE), small scale subsistence and semi-subsistence farms remain widespread. The resilience of small subsistence and semi-subsistence farms has generated substantial debate concerning their role and future, particularly in relation to the EU membership, as the New Member States (NMS) have to compete in the single EU market.

A lack of agreement regarding the role and prospects of subsistence farming characterizes the academic literature. One school of thought treats subsistence and semi-subsistence farms in Europe as an unwanted phenomenon that impedes economic growth in rural areas. It has been traditionally associated with backwards technology and low efficiency, using scarce resources which could have been allocated to more efficient uses (Kostov and Lingard, 2004). Usually, subsistence production is linked to poverty (Mathijs and Noev, 2004).

However, subsistence farming may act as an important survival strategy not only in low but also in middle income countries during periods of drastic economic reforms and/or economic recession. Brüntrup and Heidhues (2002) argue that subsistence farming is a mechanism for survival under difficult and risky conditions in fragile economies. Kostov and Lingard (2004) emphasize its potentially positive impact for the welfare of agricultural households in situations where there is no demand for their resources from the commercial sector.

The arguments above treat subsistence farming not as a voluntary choice but as a necessity; households are forced into subsistence by economic shocks and/or imperfect markets. However, subsistence farming could be a strategy selected by choice. Households with non-farm incomes or retired households may prefer to grow and consume their own food. This aspect of subsistence farming has received little attention in the literature on developing countries or CEE, but in

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Western Europe and North America several studies address 'hobby farming' (Daniels, 1986; Holloway, 2002).

The paper consists of two main components. First, it evaluates the role of subsistence farming for the real incomes of agricultural households in selected EU NMS. Particular attention is paid to the contribution of subsistence farming to assessments of poverty and vulnerability. Second, the paper employs multivariate statistics (factor and cluster analysis) to produce a typology of agricultural households, according to their socio-economic characteristics, farm endowments and location. The reliance of each cluster of agricultural households on subsistence production is assessed. This provides the basis for more differentiated policy recommendations. The two aspects of the research are linked: the share of the imputed monetary value of subsistence production in total household incomes is used as one of the cluster profiling variables.

The study area covers five NMS where households with small farms are widespread: Bulgaria, Hungary, Poland, Romania and Slovenia. Data were collected through primary surveys of agricultural households within the EU FP6 SCARLED project. Data collection occurred in autumn 2007 to spring 2008. As far as we are aware, this is the first post-EU accession, cross national study of subsistence/semi-subsistence production in CEE.

The paper consists of six sections. The next section includes a working definition of subsistence farming and a brief description of what is currently known about subsistence/semi-subsistence farms in the NMS. Section three focuses on the methodology, and section four describes procedures for data collection and the sample of farm households analyzed. Section five presents the factor and cluster analysis results and section six concludes.

2 Defining subsistence farming

There is no universally agreed definition of subsistence farming. Most definitions stress the objective of satisfying household food needs. Barnett et al. (1996) define the following characteristics of subsistence farming: (i) the farming activities form a livelihood strategy; (ii) the output is consumed directly; (iii) only a few purchased inputs enter the production process; (iv) the

proportion of output sold is low.[2] Mathijs and Noev (2004) argue that one problem for defining subsistence farming lies in the possibility of considering it from either a consumption or production point of view. This paper adopts the production approach. The consumption method is not preferred as any commercial operation, fully integrated in input and output markets, can still cover a great deal of food consumption of a household.

In relation to agricultural output markets, farms can be placed on a continuum from zero to 100% depending on the proportion of their output sold. At the two extremes are purely subsistence and purely commercial operations with different mixes in-between. In the NMS, farm households normally produce for their own needs but also sell to the market (Mathijs and Noev, 2004). It is assumed therefore that farms in NMS are not purely subsistence but *semi-subsistence*. This is not only a case in NMS, for instance Thorbecke (1993) argues that an important characteristic of many small-scale farms is that households produce both for sales and for own consumption. Another characteristic of such households is that they purchase some of their inputs (for example, fertilizers) and provide others themselves, e.g. family labour (Singh et al., 1986).

In this paper, 50% of output sold is used as a threshold for classifying farm households as mainly subsistence/semi-subsistence or mainly commercial. This threshold is arbitrary but has been used widely since Mosher (1970) defined subsistence farmers as those selling less than 50% of their output.[3]

The analysis of subsistence/semi-subsistence farming in the NMS is hindered by the lack of adequate data. One source of comparable cross-national data, albeit not focused on subsistence farming *per se,* is the EU Farm Structure Survey (FSS). To comply with EU requirements, the five countries analyzed conducted a FSS in 2005 and 2007. So far EUROSTAT has published data for 2007 for Hungary, Poland and Slovenia. For the two countries that joined the EU in the most recent enlargement, Romania and Bulgaria, data are from 2005.

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[2] See Kostov and Lingard (2004) for a more extensive review of definitions of subsistence farming.

[3] Another approach, based on household modeling, splits households into subsistence and commercial operators and uses the concept of non-separability of production and consumption (Singh *et al*., 1986). The latter authors show that under market failure household production and consumption decisions become non-separable.

The FSS surveys focus on commercial farms including all farms of an economic size of at least one European Size Unit (ESU).[4] However, EUROSTAT also publishes the number of holdings that produce mainly for own consumption and splits these holdings by economic size, i.e. smaller or larger than one ESU (Table 1). Table 1 indicates that for the five countries studied, there are approximately 5.3 million farm holdings which produce mainly for household consumption. In general, they are very small farms, with less than one ESU. One notable exception is Slovenia where most of the subsistence/semi-subsistence farms are larger than one ESU.

3 Methodology

The study comprises of two methodological stages. The first step focuses on the valuation of unsold output and the estimation of its contribution to the total household income. This step helps answer the following questions: (i) does subsistence farming make an important contribution to real household incomes? (ii) is this contribution more important in those NMS that are towards the poorest end of the EU Member States, e.g. Bulgaria and Romania, than it is in the Central European countries? (iii) what role does subsistence farming play for poor and vulnerable households?

The second step identifies homogeneous groups of farm households, using factor and cluster analysis, based on the head of the household and household members' characteristics; their farm endowments, location and the contribution of subsistence farming to their incomes. The purpose of this step is to see whether there are systematic characteristics of households that are more dependent on subsistence production. It also allows for, if heterogeneity of agricultural households is uncovered, the formulation of more focused policy recommendations. The two steps are explained in more detail below.

[4] According to FSS methodology, an ESU is a measure of the economic size of a farm business. For each farm enterprise a standard gross margin is estimated, based on the area or heads of livestock, and a regional coefficient. The sum of these standard gross margins in a farm is its economic size expressed in ESU. One ESU is equal to 1,200 Euros. For example, in England, one ESU roughly corresponds to either 1.3 hectares of cereals, or 1 dairy cow, or 25 ewes, or equivalent combinations of these (DEFRA, 2004). https://statistics.defra.gov.uk/esg/asd/fbs/sub/europe_size.htm (2008-10-05)

3.1 Valuation of unsold output

Unsold output, product by product, was valued at market prices as a proxy for opportunity costs. If a household sold a portion of their output in the market, the same price was imputed to the unsold quantity as it was assumed that the price the household received was the best indication of the quality of the output. In cases where the household consumed all output produced, crops were valued using a weighted average price for the village. In cases where in a particular village there were only a few observations of output sold and there were large differences in reported prices, either regional averages or country averages were taken from national statistics.

The data did not allow for 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 average price was calculated it was a simple arithmetic average.

An important objective of this part of the study is to investigate whether the monetary value of unsold output is of greater importance for poor and vulnerable households (see also Petrovici and Gorton, 2005). For identification of poor households, the EUROSTAT definition of at-the-risk-of-poverty is used. It refers to individuals living in households where the equivalised income is below the threshold of 60% of the national equivalised median income.[5] Equivalised income is defined as the household total income divided by the equivalent size of the household. The household equivalent size was calculated using the modified OECD equivalence scale, giving 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.

Vulnerability is a more elusive concept. The World Bank addresses vulnerability from a social risk management perspective and defines vulnerable households as those that are more exposed to uninsured risk and shocks, and are less able to manage these effectively (Kozel et al., 2008). For the purpose of this research, vulnerability refers to households who depend on unearned income (social transfers) and subsistence production, i.e. pensioners, long-term unemployed. Vulnerable households may also be poor. We utilise as a proxy for vulnerability

[5] The at-the-risk-of-poverty thresholds per capita were in 2006: €1022 (Bulgaria); €2308 (Hungary); €1867 (Poland); €828 (Romania) and €5589 (Slovenia).

the dependency ratio, which is a ratio between consumers (dependent members outside working age) and workers (the economic active members) and is notated as *c/w* ratio. In calculating the dependency ratio, EUROSTAT and European Commission age brackets were used as they are appropriate for the countries studied. The dependency ratio is defined as the ratio of the household members aged 0-19 and 65 and over, divided by the members 20-64.

As a *c/w* ratio cannot be calculated for households without any economically active members, e.g. pensioner households, these households were assigned a *c/w* ratio of 8 (the highest *c/w* ratio within the sample for households that had economically active members was 7). Vulnerable households were defined as pensioner households without any economically active member and other households with a *c/w* ratio of 3 or higher.

As data from the five countries were pooled together, all income indicators have been converted into Euro using EUROSTAT purchasing power parities (PPP) for 2006, the reference year for the collected data.

3.2 Factor and cluster analysis

To better profile agricultural households, cluster analysis was conducted to define groups with the maximum homogeneity within the groups and maximum heterogeneity between the groups (Hair et al., 1998). The cluster analysis was preceded by a factor analysis since multicollinearity between the variables selected for clustering would bias the results. Factors were obtained through principal components analysis with varimax rotation. Factors presenting an eigenvalue greater than one were chosen. The cut-off applied was factor loadings greater or equal to 0.5 on at least one factor. Two tests assess the appropriateness of the factor solution. The Kaiser-Meyer-Olkin measure of sampling adequacy was used to judge whether the data matrix had sufficient correlation to justify the application of factor analysis. Bartlett's test of sphericity assesses the significance of the correlation matrix in order to reject the null hypothesis that the correlation matrix is the identity matrix.

The factors formed the basis of the cluster analysis. The latter followed a two-stage approach. First, a hierarchical technique was used to establish the number of clusters and to profile the cluster centers. Then, the observations were clustered by a non-hierarchical method with the cluster centers from the

hierarchical results used as the initial seed points. This combined procedure allows one to take maximum benefit of the advantages associated with hierarchical and non-hierarchical methods, while at the same time minimizing the drawbacks (Punj and Stewart, 1983; Milligan, 1996).

Table 2 details the variables included in the factor and cluster analysis. As the objective is to produce a typology of agricultural households, we draw on Munton's (1990) analysis of the strategies of family farms to identify suitable variables. Munton (1990) argues that farm households have seven main inter-related elements that can be adjusted. The seven elements are: labor, business type/location, business structure, farm size, production mix, economic centrality (e.g. presence of off-farm income) and diversification elements. Using this as a framework, the cluster analysis draws on the following variables: age of the head of the household (HH), time spent on-farm by HH, time spent by HH in non-farm wage employment, total number of household members, total cultivated area, size of biggest plot, distance to largest plot, distance to most distant plot, total household income, distance to nearest urban centre and the real value of subsistence production as a share of total income.

The validation of the clusters depends on an array of additional variables. This includes variables characterizing the head of the household (e.g. education); household characteristics (*c/w* ratio; equivalised income per capita (PPP) with and without the valuation of subsistence production; share of own produced food in food consumption); farm characteristics and location (share of sales in agricultural output, value of agricultural equipment identified by respondent assessment of the sale value). Some binary variables were also used in the validation process, e.g. the incidence of poverty and vulnerability per cluster; labor allocation – namely the number of household members engaged in wage employment; the number of household members that are self-employed outside agriculture; capital and technology – farming with own agricultural machinery; with others' agricultural machinery; with own machinery and draft animals; with others' machinery and draft animals, and farming mainly with manual labor. The capital/technology variables provide an insight into whether the households that are most dependent on subsistence agriculture rely almost exclusively on manual technology.

4 Data collection and sample description

4.1 Sampling and data collection

A questionnaire to survey agricultural households was designed, collecting both quantitative and qualitative information. The questionnaire solicited data, amongst other items, regarding four relevant topics: (i) household head and household members characteristics; (ii) household income, employment and time allocation; (iii) agricultural land and non-land assets, production, and sales; (iv) household attitudes to their farming activities, and their perceptions of drivers for and impediments to commercial agricultural activity.

The survey employed geographical cluster sampling. Regions and villages were selected through a two-stage clustered sampling process. In the first stage, three regions in each of the five surveyed countries were selected according to their degree of economic development: (i) lagging behind (ii) average and (iii) prosperous, corresponding to a GDP per capita below, similar to and higher than the national average. The survey targeted rural areas, and for this reason the regions of the capital city and other large cities were excluded from the selection. EUROSTAT data at the NUTS3 level were used as a basis for this selection. In the second stage, three villages per NUTS3 region were selected (again with a view to cover the variations within the NUTS3 regions, namely a prosperous, average and lagging behind village in comparison to the regional mean). Only households that were engaged in agricultural production in two time points, 2006 and/or 2003, including production from gardens or yards belonging to the house, were included in the sample.

The survey was implemented via face-to-face interviews using local enumerators. Altogether, in the five countries 1,361 agricultural households were surveyed. After cleaning data for outliers and checking for valid entries for incomes and agricultural production, 1,124 usable records were available (Bulgaria 224, Hungary 219, Poland 229, Romania 257 and Slovenia 195).

4.2 Descriptive statistics of the sample

Table 3 presents the descriptive statistics of variables of interest for the sample pooled for the five countries. It indicates that the mean cultivated area is fairly small, 10 ha, but that agriculture accounts for the majority of the head of the household’s working time (mean of 73.2%). Some households reported

livestock production only, i.e. they did not also cultivate land. For this reason the minimum referring to variables e.g. total cultivated area, area of the biggest plot, distances to the biggest and farthest plot is zero. The standard deviation of the value of agricultural machinery is large. Some households are capital poor and do not own agricultural machinery.

The mean c/w ratio does not suggest vulnerability but a high standard deviation is apparent. For the vulnerable households in the sample, the dependency ratio is 5.8. At first glance, the location characteristics, represented by the distance to the nearest urban centre, do not suggest remoteness. Most farm within the local area (less than 4 km away from home) and are, on average, 23 km away from the nearest urban centers. These distances do not suggest isolation. However, in the presence of inadequate transport infrastructure and a lack of access to a private vehicle, some households might find their location impedes their ability to reach buyers and wholesale markets.

On average, the sample households sell less than one-half of their agricultural output, which, following Mosher (1970), classifies them as subsistence orientated. Home produced food covers a substantial part of their food consumption. Following the procedures outlined in section 3.1, subsistence production accounts for 18.1% of real household incomes. However, the above observations refer to the sample means. The minimum and maximum values indicate extreme cases of full dependence on subsistence farming, or conversely, a completely commercial focus. Table 3 indicates a large standard deviation of incomes per capita which increases with the valuation of unsold output.

5 Results

5.1 Importance of subsistence farming for real agricultural household incomes

The valuation of unsold output, sometimes also referred to as valuation of income in kind, provides an indication of the contribution of subsistence farming to household welfare. Table 4 provides a general picture of the contribution of subsistence farming to real household income.

Subsistence production valued at market prices contributes significantly to household incomes, particularly in Romania, Bulgaria and Poland. Although in Hungary there are more than half a million farms producing mainly for self-

consumption (see Table 1), its contribution to household incomes is nonetheless modest. Most of these households generate the majority of their income from non-farm activities.

As expected, the contribution of subsistence farming is higher for households that are below poverty line (the poverty line is calculated before the valuation of the unsold output). Notably, subsistence farming appears to be crucial for the survival of poor agricultural households in Romania (Table 4). This is an important finding given the number of holdings engaged in small-scale production in Romania (Table 1). For poor households, income in kind from subsistence production accounts for more than 50% of real income per capita.

Subsistence production relives poverty but it is not enough to eradicate it. Figure 1 indicates that after the valuation of unsold output the number of poor households, and those who are simultaneously poor and vulnerable decreases. The number of vulnerable households who are not poor increases slightly.

Despite the critical importance of subsistence production for the real incomes of the Romanian poor, it is in Bulgaria where the effect of the valuation of income in kind has the largest effect, measured by the switch of households from below to above the poverty line (Table 5). In Bulgaria approximately 11% of sampled households are reclassified as non-poor as a result of valuing subsistence production. For the whole sample, 65 households (5.8%) switch from being classified as poor to non-poor due to the valuation of subsistence production.

The valuation of the contribution of subsistence farming also affects the distribution of incomes. Figures 2 and 3 plot the distribution of equivalised income per capita for Bulgaria, where the effect of subsistence seems to be the most pronounced, pulling households above the poverty line, excluding and including the value of unsold output respectively. As expected, the density of income distribution is right skewed. The valuation of unsold production does not affect the right tail but on the left the frequency of the lowest income households decreases.

5.2 Cluster analysis

As explained in the methodology section, cluster analysis was preceded by factor analysis. A five-factor solution was adopted, choosing the factors that present an eigenvalue greater than one. This solution explains 73% of the total

variance in the data set, which is satisfactory. The cut-off for interpretation purposes is factor loadings greater or equal to 0.5 on at least one factor. Two tests confirmed the appropriateness of the factor analysis. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.62, indicating that the data matrix had sufficient correlation to justify the factor analysis. Bartlett's test of sphericity was statistically significant at the 1% level, implying that the hypothesis that the correlation matrix is the identity matrix could be rejected.

The first factor is associated with the head of the household's characteristics and their labor allocation (age, time spent on-farm and time spent on wage employment). The second factor is farm size, captured in terms of the total cultivated area and the size of the biggest plot. Factor three can be labeled 'farm fragmentation' and it is related to the distances to the biggest and to the most distant plot. The next factor represents household size – the number of household members and the total household income. The fifth factor, labeled market access, is associated with the distance to the nearest town and the contribution of subsistence production to the real household incomes. Table 6 presents the rotated component matrix.

These five factors formed the basis for cluster analysis. Applying the clustering method explained in the methodology section, a four cluster solution was obtained (Table 7). Tables 8 and 9 present the cluster validation variables and detail the distribution of cluster membership by country respectively.

Cluster 1 – Relatively large, commercially oriented households

The smallest cluster in the sample, this group stands out from others with respect to most of the profiling and validation variables. This cluster has significantly larger assets (land, agricultural equipment), higher shares of sales, and higher incomes than others. This identifies the cluster as comprised of relatively large, commercially oriented holdings. The mean farm size is 63 ha. Hired labor, credit and technical assistance are used to a greater extent in comparison with other clusters. Farming is more mechanized and ownership of agricultural machinery is significantly higher. Regarding vulnerable and poor households, these are noticeably underrepresented in this group. Counting the value of subsistence production, no household in this group falls below the threshold for being at the risk of poverty. Subsistence production as a share of total income is low for this

group, even when bearing in mind that the value of subsistence production also includes possible inputs in production. In addition, this cluster has the lowest share of food consumption from own production.

With reference to their objectives regarding farming within the next five years (Table 10), 40% of the cluster's households intend to maintain business as usual. However, over one-third seek to intensify farming (increasing labor/resource inputs) or increase share of sales. In the case of those that intend to leave agriculture in the next five years, the main objective is to transfer to the next generation, which does not necessarily translate into decreasing farming activity for the holding as a whole. None are seeking to cease farming altogether.

Concerning the distribution of countries within this cluster, Hungary is the largest contributor, accounting for close to half of the cases (45.8%) followed by Slovenia (25.0%), Bulgaria (16.7%) and Romania (10.4%). Only one Polish household is included in this cluster.

Cluster 2 – Medium-sized commercially oriented households

This cluster accounts for approximately 22% of the sample and like the first cluster can also be profiled as commercially oriented based on the average share of sales (Table 8). However, the cultivated land area for this cluster is significantly lower (mean of 8 ha, which is close to the average for the sample). Similar to Cluster 1, the head of the household is primarily engaged in agriculture. However, differences between the clusters are striking. Firstly, subsistence production is very important for Cluster 2 both in terms of income and food consumption. Excluding the value of subsistence production, this cluster has the lowest equivalised income per capita and over one fourth of the group falls below the poverty line. Including subsistence production shifts nearly half of the poor households above the poverty line, yet the cluster still has the largest share of poor households. One possible explanation for the low incomes and the high importance of subsistence production for this cluster may be its remote location. With an average of 45.7 km to the nearest urban centre, it is likely that off-farm employment opportunities are limited (reflected by the low share of time spent in non-farm wage employment and the high share of households with no members in wage employment). As a consequence, farming

becomes the main income source and also a necessity to satisfy the household's consumption needs.

Regarding farming technology, this cluster has the lowest share of mechanization (66.1%) and about one third of the sample farms either manually (21.9%) or with a combination of draft animals and machinery (10.7%). The value of owned agricultural machinery is consequently low. Within a time-frame of five years, most households intend to maintain their current level of activities but more than one-fifth plan to intensify farming. This cluster is dominated by Bulgarian households (60.7%), followed by Poland (21.0%). Hungarian, Romanian and Slovenian households are poorly represented.

Cluster 3 – Part-time farmers

This cluster accounts for 28% of the sample. Non-farm waged employment is the main income activity and the contribution of subsistence production to real incomes is relatively modest (14%). Only 28.9% of households in this cluster do not have at least one member engaged in wage employment. However, it would be incorrect to label these households "hobby farmers" as they cultivate, on average, areas far larger than what would typically be considered as a hobby activity (5.6 ha). Moreover, households sell quite a large share of their output (45.5%) and farm their land using agricultural machinery (78.0%). Bearing this in mind, "part-time farmers" is a more suitable descriptor. The shares of poor and vulnerable households within this cluster are fairly low, and income-wise this cluster is relatively well-off compared to medium-sized commercial households (Cluster 2) and older, dependent households (Cluster 4). The cluster is unlikely to disappear in the short to medium term – the majority plan to continue their operations with no change in the next five years. Only approximately one-tenth intend to retire or cease farming in the same time period. This cluster is reasonably well spread over the five countries, with Romanian households being the single largest nationality (26.8% of cluster members).

Cluster 4 – Older, dependent households

By far the largest cluster in the sample (46%), this group is dominated by significantly older heads of households than the other clusters (61.2 years) who

spend close to all of their time on-farm (96.8%). The cluster holds the largest share of vulnerable households (19.7%) and the dependency ratio is significantly higher compared to the other clusters, indicating that the cluster is skewed towards the elderly. However, the average household size is just above three members and a majority of the households have at least one household member engaged in wage employment, implying that the households in this cluster are not purely pensioner households. For this reason, this cluster can be classified as older, dependent households rather than pensioners.

Households within this category are mainly subsistence oriented (52%), with a quite high average share of sales (44.6%). They farm mainly with household labor only and cultivate on average 6.1 ha. Only a small fraction of this cluster takes out credit for production and marketing, and technical assistance is not widely used (14.9%). Subsistence production is important for this group both in terms of topping up income (17.1%) and for food consumption (44.0%). When including the value of subsistence production, the share of poor households decreases from 14.7 to 9.6%. Still, counting the value of subsistence production, this group has the lowest equivalised income per capita in the sample.

With regards to their objectives in the next five years, 58% envisage no changes. Less than 2% plan to retire and 7% envisage ceasing farming. It is likely that their engagement in farming will only end when they can no longer continue physically, rather than a voluntary choice to retire. All countries are represented in this cluster with one third of the group comprised of Romanian households, with Hungarian, Polish and Slovenian households constituting about one fifth each.

6 Conclusions

The paper contributes to research on subsistence and semi-subsistence farming in the NMS by drawing on a recent and relatively large dataset (n=1124 useable responses). The latter provides detailed information on agricultural households in contrasting rural regions of five countries (Bulgaria, Hungary, Poland, Romania and Slovenia). The research generates four key conclusions.

First, *subsistence production remains pervasive in the NMS*. Using Mosher's (1970) definition of subsistence farmers as those selling less than 50% of their output, the majority of those sampled can be classified as subsistence oriented.

The prevalence of subsistence production is unlikely to change in the short to medium term – the majority of those sampled envisaged no change in their farming operations in the next five years. Subsistence production should not be seen as merely a transitional phenomenon in CEE – twenty years after the downfall of socialist regimes it remains a critical characteristic of agriculture in the NMS.

Second, *the contribution of subsistence production to real incomes is uneven but significant*. Using the procedures outlined in Section 3.1, the equivalent value of subsistence food production is €1854.1 per capita, accounting for, on average, 18.1% of the real incomes of sampled households. The contribution of subsistence production to real incomes is greatest in Romania and Bulgaria (28.1 and 22.4% of equivalent incomes per capita) and least important in Hungary and Slovenia (7.1 and 9.1% respectively). There is therefore a divide between Romania and Bulgaria and the 2004 NMS. For the sample as a whole the valuation of subsistence production pushes 5.8% of the sample above the poverty line (equivalent to roughly one third of those classified as poor prior to the valuation of such production). Given the large number of small-scale farms outlined in the EU FSS, this is an important finding. The level of subsistence production in NMS results in estimations of poverty being sensitive to its valuation.

Third, *cluster analysis reveals the distinctiveness of farming in CEE*. Only 48 agricultural households (4.6% of the sample) fall into Cluster 1. Relatively large, commercially oriented households characterise Cluster 1, which have a mean farm size of 62.9 ha, similar to what would be considered a medium sized family farm in Western Europe (Shucksmith and Herrmann, 2002). It is the latter group, which are central to the 'European model of farming' and the traditional focus of the Common Agricultural Policy (CAP) (Brookfield and Parsons, 2007). The vast majority of agricultural households in the NMS do not fit with notions of what constitutes a family farm in Western Europe. Clusters 2, 3 and 4 operate on a much smaller level (mean farm sizes of 8, 5.6 and 6.1 ha respectively) but the contribution of farming to total incomes makes them far more than merely 'hobby farms'. These 3 clusters are however not the main beneficiaries of CAP direct payments (Davidova, 2008), which for the NMS are currently paid on a simple per hectare basis.

Finally, highest in Clusters 2 and 4, *poverty is associated with remote locations, relatively small farm sizes and the lack of off-farm work*. Lower incomes and a higher incidence of poverty (26.8% of group) characterize Cluster 2 compared to Cluster 3, despite the former operating slightly larger, on average, farms. This is because households in Cluster 3 boost their incomes from off-farm work. Households in Cluster 2 appear less able to follow this strategy because of their location; they are distant from the nearest urban centre. A relatively low level of wage employment also characterizes Cluster 4, linked in the latter case to a higher proportion of elderly household members. Cluster 4 comprises households from all countries and its problems are not state specific. Both Clusters 2 and 4 are thus fairly reliant on agriculture for their livelihood but do not possess sufficiently large farms (such as in Cluster 1) to generate high incomes. As evidenced in Table 10, the majority are unlikely to alter their farming operations in the short to medium term. This suggests that their fortunes will be closely linked to social security systems, particular pensions for Cluster 4, and whether the non-farm rural economy expands to provide alternative occupations in remote rural locations. Cluster 3 would be vulnerable to a decline in off-farm work as their farms are also insufficient alone to generate reasonable incomes.

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Table 1 Farm subsistence orientation in the studied NMS*

	Bulgaria	Hungary	Poland	Romania	Slovenia
Number of holdings producing mainly for own consumption (in thousand)	367.9	522.6	908.2	3444.8	45.6
Share of holdings producing mainly for own consumption of size less than 1 ESU (%)	88.4	85.3	75.5	75.2	26.9

Source: EUROSTAT (2007a, 2007b, 2008a, 2008b, 2009)

Notes: * Hungary, Poland and Slovenia data for 2007; Bulgaria and Romania data for 2005.

Table 2 Variables used in factor and cluster analysis

Variable
Age of household head
Time spent on-farm by household head (%)
Time spent on non-farm wage employment by the household head (%)
Total number of household members
Total cultivated area (ha)
Size of biggest plot (ha)
Distance to most distant plot (km)
Distance to biggest plot (km)
Total household income (PPP€)
Distance to nearest urban centre (km)
Subsistence production as share of total income (%)

Table 3 Descriptive statistics for the sample households (2006)

n=1124	Min	Max	Mean	Std. D.
Age of household head (HH)	18	91	54.0	13.0
Share of time spent time on-farm by HH	0	100	73.2	36.6
Time spent on wage employment by HH	0	100	19.3	32.6
Education level of HH	1	7	3.4	1.3
Total number of household members	1	9	3.5	1.6
c/w ratio	0	8	1.3	2.3
Total cultivated land area 2006 (ha)	0	460	10.0	25.2
Size of biggest plot (ha)	0	72	3.2	6.6
Distance to most distant plot (km)	0	80	3.9	5.7
Distance to biggest plot (km)	0	45	2.5	3.6
Total household income (PPP€)	235	269229	17288.7	16849.6
Distance to nearest urban centre (km)	4	78	23.1	18.5
Share of sales of agricultural output (%)	0	100	48.2	35.5
Food consumption from own production (%)	0	100	41.5	27.8
Equivalised income per capita (PPP€)	78	86848	8023.7	7351.8
Equivalised income per capita incl. unsold quantities (PPP€)	183	191753	9877.8	10087.7
Subsistence production as share of total income	0	98.5	18.1	17.5
Value of agricultural equipment (PPP€)	0	680343	11166.9	34290.1

Table 4 Contribution of subsistence farming to households' income per capita by country

	Bulgaria	Hungary	Poland	Romania	Slovenia
Value of unsold output/capita (PPP€)	2,225	807	2,294	1,868	2,069
Unsold output in income per capita (%)*	22.4	7.1	20.6	28.1	9.1
Unsold output in income per capita of poor households (%)*	25.1	19.1	27.7	52.7	17.3

Note: * Calculated as equivalised value of unsold output per capita / equivalised income per capita including the value of unsold quantities.

Table 5 Sensitivity of assessments of poverty to the valuation of subsistence production by country, 2006 (in brackets %)

	Below poverty line excl. unsold output		Below poverty line incl. unsold output		Pushed above poverty line when incl. unsold output	
	Number	Share	Number	Share	Number	Share
Bulgaria	59	26.3%	35	15.6%	24	10.7%
Hungary	32	14.6%	24	11.0%	8	3.7%
Poland	21	9.2%	8	3.5%	13	5.7%
Romania	13	5.1%	5	1.9%	8	3.1%
Slovenia	50	25.6%	38	19.5%	12	6.1%
Sample total	175	15.6%	110	9.8%	65	5.8%

Table 6 Rotated component matrix

	HH characteristics	Farm size	Land fragmentation	Household size	Market access
Age of Head of the Household (HH)	**0.602**	-0.138	0.035	-0.312	-0.240
Time spent on-farm by HH (%)	**0.905**	0.016	0.015	0.034	0.146
Time spent on non-farm wage employment by HH (%)	**-0.903**	-0.035	-0.023	-0.062	-0.122
Number of household members	-0.021	-0.014	0.013	**0.818**	0.094
Total cultivated area (ha)	0.010	**0.875**	0.190	0.132	0.058
Size of biggest plot (ha)	-0.042	**0.907**	0.069	0.003	-0.012
Distance to most distant plot (km)	0.056	0.146	**0.872**	0.072	0.052
Distance to biggest plot (km)	0.000	0.101	**0.890**	0.004	-0.028
Total household income (PPP€)	-0.022	0.441	0.122	**0.641**	-0.249
Distance to nearest urban centre (km)	0.042	0.002	0.037	0.139	**0.773**
Subsistence production as share of total income (%)	0.087	0.010	-0.023	-0.445	**0.631**

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

Rotation converged in 5 iterations.

Table 7 Cluster analysis

	1 n = 48	2 n = 224	3 n = 287	4 n= 477	Mean	4 –cluster *F*-test	
Age of household head	50.0	49.3	46.9	61.2	54.2	116.3	***
Time spent on-farm by household head (%)	75.1	86.7	25.7	96.8	73.9	809.7	***
Time spent on non-farm wage employment by the household head (%)	14.4	5.9	61.0	0.2	18.9	675.3	***
Total number of household members	4.08	4.17	3.40	3.13	3.47	26.7	***
Total cultivated area (ha)	62.9	8.0	5.6	6.1	9.0	328.3	***
Size of biggest plot (ha)	20.3	2.5	2.1	2.2	3.1	211.2	***
Distance to most distant plot (km)	14.8	4.0	3.1	3.2	3.9	82.0	***
Distance to biggest plot (km)	8.9	2.2	2.3	2.1	2.5	67.8	***
Total household income (PPP€)	45223	15694	16683	15468	17232	63.9	***
Distance to nearest urban centre (km)	21.6	45.7	18.0	16.6	23.5	225.8	***
Subsistence production as share of total income (%)	14.3	29.0	13.7	17.1	18.6	39.5	***

Notes: *** −1%-level of significance

Table 8 Variables for validation of the clusters

	1 N = 48	2 n = 224	3 n = 287	4 n = 477	Mean	4 –cluster *F*-test	
Continuous variables							
Education level of household head	3.2	3.9	3.9	3.0	3.5	43.83	***
c/w ratio	0.84	1.11	0.96	1.69	1.32	7.60	***
Share of sales in agricultural output 2006	73.3%	54.3%	45.5%	44.6%	48.3%	12.65	***
Share of food consumption from own production	33.8%	46.4%	38.4%	44.0%	42.5%	5.70	***
Equivalised income per capita (PPP€)	19370	6551	8130	7499	8019	53.88	***
Equivalised income per capita including unsold quantities (PPP€)	22326	9167	9257	8908	9683	50.19	***
Value of agricultural equipment (PPP€)	85027	11321	10985	14400	16453	44.99	***
Binary variables							
Vulnerable households (%)	4.2	8.0	11.5	19.7	14.2		
Below poverty line (%)	4.2	26.8	8.4	14.7	15.1		
Below poverty line incl subsistence production (%)	0.0	14.7	5.9	9.6	9.3		
No household members who are self-employed (%)	85.4	91.5	92.7	93.5	92.5		
No household members in wage employment (%)	33.3	48.2	28.9	41.1	38.9		
Farming with household labour only (%)	62.5	75.9	90.9	86.2	84.2		
% owning agricultural machinery	72.9	43.8	41.8	40.3	43.0		
% using others' agricultural machinery	20.8	22.3	36.2	40.3	34.4		
% using own draft animals and agricultural machinery	2.1	8.5	4.5	3.6	4.8		
% using others' draft animals and agricultural machinery	0.0	2.2	2.4	4.0	3.0		
Farm only manually (%)	4.2	21.9	13.6	10.7	13.6		

Note: *** −1%-level of significance

Table 9 Cluster membership by country

	1	2	3	4
Bulgaria				
Number of households	8	136	34	35
% of cluster membership	16.7	60.7	11.8	7.3
Hungary				
Number of households	22	8	64	87
% of cluster membership	45.8	3.6	22.3	18.2
Poland				
Number of households	1	48	54	97
% of cluster membership	2.1	21.4	18.8	20.3
Romania				
Number of households	5	18	77	156
% of cluster membership	10.4	8.0	26.8	32.7
Slovenia				
Number of households	12	14	58	102
% of cluster membership	25.0	6.3	20.2	21.4
Sample total	48	224	287	477

Table 10 Main objective for the household in relation to agriculture within the next five years (%) by cluster

	Cluster			
	1	**2**	**3**	**4**
▪ No change	39.6	44.3	54.5	57.6
▪ *Objectives committing to farming*				
– Intensify farming (increase labor/resource input)	20.8	21.7	8.6	5.5
– Increase the share of sales	16.7	6.3	6.1	4.9
– Specialize farming	2.1	4.5	3.9	2.0
Sub-total:	*39.6*	*32.6*	*18.6*	*12.4*
▪ *Objectives to phase out farming*				
– Transfer to the next generation	14.6	6.3	7.5	10.0
– Scale down farming	2.1	6.3	8.6	9.5
– Retire	2.1	2.3	2.2	1.8
– Decrease farming intensity (decrease labor/resource input)	2.1	1.4	1.4	1.3
– Cease farming	0.0	6.8	7.2	7.3
Sub-Total:	*20.8*	*23.1*	*26.9*	*29.9*

Figure 1 Effect of subsistence production on poor and vulnerable households

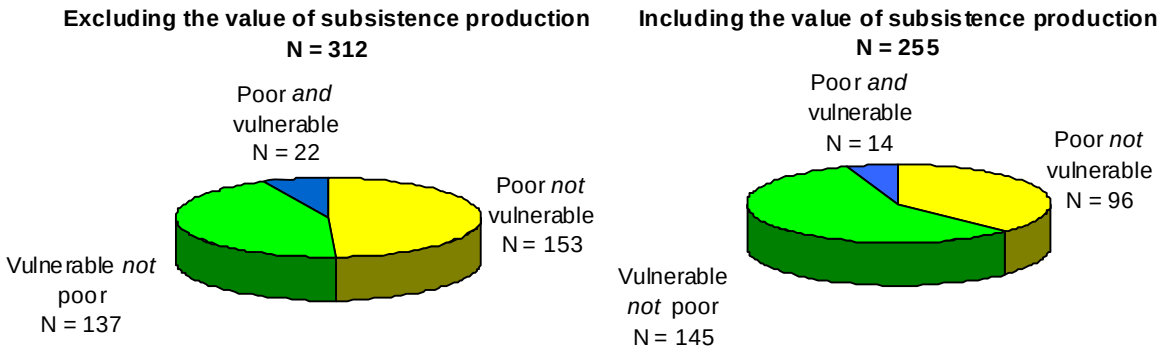

Figure 2 Density distribution of household incomes in Bulgaria prior to the valuation of unsold output

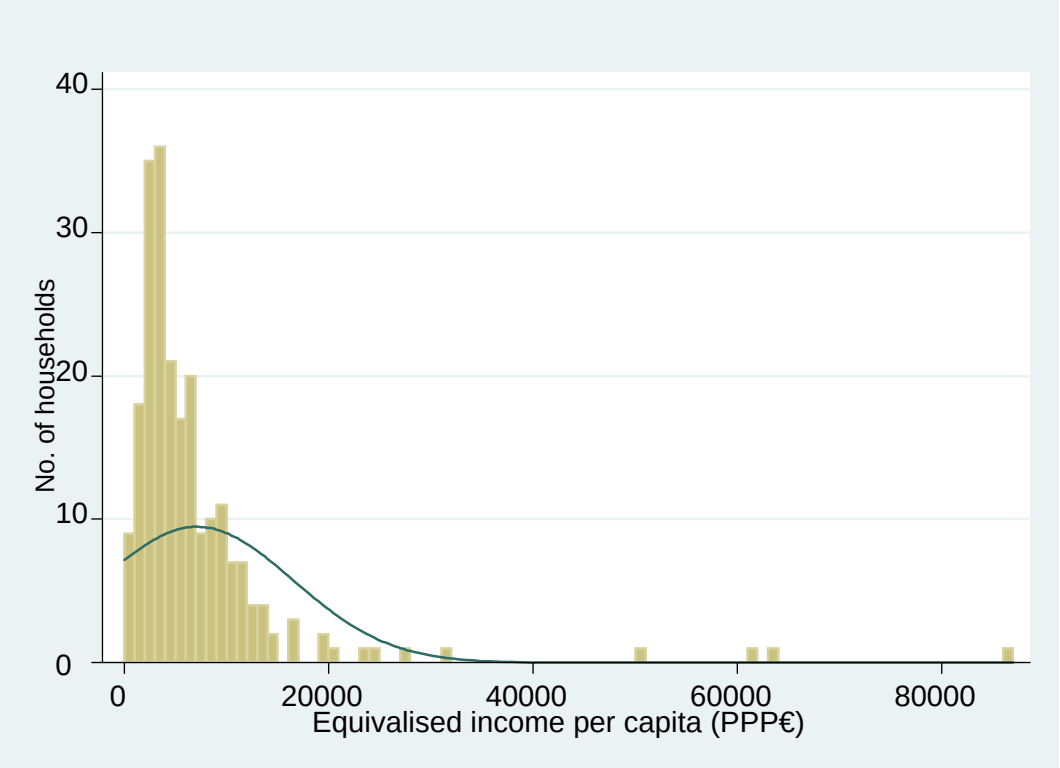

Figure 3 Density distribution of household incomes in Bulgaria following the valuation of unsold output