SCARLED
Structural Change in Agriculture and Rural Livelihoods

Priority Area
"Sustainable management of Europe's natural resources"

CONTRACT No. SSPE-CT-2006-0044201 (STREP)
Project start: 01 January 2007
Duration: 45 months

DELIVERABLE 6.3
"The importance of subsistence farming as a safety net in the NMS"

Lena Fredriksson[1], Sophia Davidova[1] and Matthew Gorton[2] [3]

WP leader for this deliverable	**UNIKENT**
Partners involved	**UNIKENT**
Document status:	**Draft Version**
Due date of deliverable:	**31 December 2008**
Date:	**April 2010**

Dissemination level (see DoW p. 27-30)		
PU	Public	☑
PP	Restricted to other programme participants (including the Commission Services	☐
RE	Restricted to a group specified by the consortium (including the Commission Services)	☐
CO	Confidential, only for members of the consortium (including the Commission Services)	☐

[1] School of Economics, University of Kent, United Kingdom, S.M.Davidova@kent.ac.uk and lef8@kent.ac.uk
[2] School of Agriculture, Food and Rural Development, Newcastle University, United Kingdom matthew.gorton@newcastle.ac.uk

[3] The authors gratefully acknowledge financial participation from the European Community under the Sixth Framework Programme for Research, Technological Development and Demonstration Activities, for the Specific Targeted Research Project "SCARLED" SSPE-CT-2006-044201.
The views expressed in this publication are the sole responsibility of the authors and do not necessarily reflect the views of the European Commission.

Abstract

This deliverable investigates the importance of subsistence farming in five EU NMS: Bulgaria, Hungary, Poland, Romania and Slovenia. Subsistence production is valued in monetary terms and its contribution to total incomes of rural households is assessed. Particular attention is paid to the impact of its valuation on alleviating rural poverty. The results indicate that subsistence production is more widespread in the poorer NMS - Bulgaria and Romania, and generally of higher importance for households below the poverty line. Factor and cluster analysis is applied to create a typology of rural households. Four broad categories of households are identified: i) large commercially oriented holdings; ii) part-time farmers; iii) small commercially oriented households; and iv) small subsistence oriented households.

Executive Summary

Twenty years after the downfall of socialist regimes in Central and Eastern Europe (CEE), the farm structure in most of the 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 in the NMS are subsistence or semi-subsistence with limited or no market participation (Fritzsch *et al.*, 2009). 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. However, on the other hand, subsistence (SF) and semi-subsistence farming (SSF) may play an important role as a safety net in rural areas and provide a substantial share of the food needs of poor agricultural households. In order to inform policies about the need, or otherwise, to stimulate the commercialisation of subsistence and semi-subsistence farmers it is necessary to investigate the role of subsistence farming in the NMS.

This deliverable consists of two main components. First, it evaluates the role of subsistence farming for the total incomes of agricultural households in selected NMS. Particular attention is paid to the contribution of subsistence farming to assessments of poverty. 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 on subsistence production of each cluster is assessed. The typology provides the basis for engaging in a wider policy debate regarding agricultural households and the appropriateness of the CAP for the NMS. The two aspects of the research are linked through the share of the imputed monetary value of subsistence production in total household incomes being used as one of the cluster profiling variables.

The data for this research was collected through a survey within SCARLED WP4[4] during autumn 2007 and winter 2008 in the SCARLED NMS partner countries (Bulgaria, Hungary, Poland, Romania and Slovenia). This deliverable contributes to research on farming in the NMS by drawing on the survey dataset of over 1,000 useable responses. The latter provides detailed information on agricultural households in contrasting three rural regions in each of the above mentioned five countries. The unit of analysis in this research is the farm household. For the purposes of SCARLED research, the agreed definition of the household is that of a single person or several individuals, not necessarily related, who live together, share meals and pool some or all of their income, and who cultivate land or keep livestock.

The research in this deliverable generates seven key conclusions.

First, *subsistence production remains pervasive in the NMS*. Using Wharton's (1969) definition of subsistence farmers as those selling less than 50 per cent of their output, 49.1 per cent 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, *estimations of poverty are sensitive to the valuation of subsistence production*. Given the large number of subsistence oriented households in the NMS, this is an important finding. For the sample as a whole the valuation of subsistence production pushes 8 per cent of the sample above the poverty line (equivalent to roughly one half of those classified as poor prior to the valuation of such production). This research indicates that the impact of subsistence production for moving households above the poverty line is strongest in the poorest EU Member State, Bulgaria. However, this effect is sensitive to the distance of the poor households from the poverty line in the individual country samples. This explains why there are significant differences to the role of subsistence production in reducing relative poverty rates between the sampled countries.

Third, *the contribution of subsistence production to total incomes is uneven but significant*. The equivalent value of subsistence food production is PPP€ 4,448 per household, accounting for, on average, 22.6 per cent of the total incomes of sampled households. Subsistence production contributes the most to rural household incomes in the poorest NMS in the sample: Romania and Bulgaria, and particularly for households below the poverty line. Only for households above the poverty line in Hungary and Slovenia does subsistence production contribute very little to total incomes.

[4] WP4: "Design and implementation of a survey instrument"

Fourth, *subsistence production is most important for remote and poor households* (Cluster 4). 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 be closely linked to social security systems and whether the non-farm rural economy expands to provide alternative occupations in remote rural locations.

Fifth, in line with Kan *et al.'s* (2006) findings, *larger commercial farms (Cluster 1) are richer and better integrated* in markets. Smaller commercial farms (Cluster 3) are also better-off concerning farm incomes. However, the latter group is less integrated in labour and credit markets. They are run by older farmers and many plan to transfer the farms within a five-year period. Some of these farmers who do not have successors may sell out and exit. Yet, overall the vast majority of those sampled intend to remain within agriculture.

Sixth, *few sampled households fit with western notions of hobby farming* (Daniels, 1986). The main motivations for farming of those sampled are to provide food for the household and to generate cash incomes. The poorest households engage in farming as a survival strategy and the smaller, more subsistence oriented farms in Clusters 2 to 4 are significantly more likely to rate meeting the standards of buyers and public regulations as a barrier to increase production and sales. This suggests that agricultural standards do act as a barrier to market participation in CEE which disproportionally affects small scale producers (Hernández *et al.*, 2007). Low prices received are perceived as the most important problem by all clusters.

Finally, the overall analysis pictures the distinctiveness of farming in CEE compared against structures in Western Europe. The largest of the four clusters has a mean farm size of 31.2 ha and agricultural equipment worth €54,687. Such farms roughly equate to what would be considered a medium sized family farm in much of 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 CAP (Brookfield and Parsons, 2007). Most agricultural households studied, as well as land cultivated, do not fit with notions of what constitutes a typical family farm in Western Europe. While Clusters 2 to 4 account for the majority of those sampled, due to the relatively small size of their farms, such households are not the main beneficiaries of CAP direct payments (Davidova, 2008), which, for the most part of the NMS, are currently paid by the CAP Pillar 1 on a simple per hectare basis.

The analysis reveals a stark mismatch between the fortunes of those who are mostly likely to benefit directly from the CAP (large commercial holdings) and those most in need (small commercially oriented and small subsistence oriented households). While a central objective of the CAP remains to ensure a 'fair standard of living for the agricultural community' (EC, 2009), current policy is unsuited for this task in the NMS.

SCARLED Consortium

This document is part of a research project funded by the 6th Framework Programme of the European Commission. The project coordinator is IAMO, represented by Gertrud Buchenrieder, whose new affiliation has been with the Martin-Luther-University Halle-Wittenberg since May 2010 (gertrud.buchenrieder@landw.uni-halle.de).

Leibniz Institute of Agricultural Development in Central and Eastern Europe (IAMO) – Coordinator
Theodor-Lieser Str. 2
06120 Halle (Saale)
Germany

Contact person: Judith Möllers
E-mail: scarled@iamo.de

University of National and World Economy (UNWE)
St. Town "Chr. Botev"
1700 Sofia
Bulgaria

Contact person : Plamen Mishev
E-mail: mishevp@intech.bg

Research Institute for Agricultural Economics (AKI)
Zsil u. 3/5
1093 Budapest
Hungary
Contact person: József Popp
E-mail: poppj@akii.hu

Banat's University of Agricultural Sciences and Veterinary Medicine Timisoara (USAMVB)
Calea Aradului 119
300645 Timisoara
Romania
Contact person: Cosmin Salasan
E-mail: cosminsalasan@xnet.ro

The University of Kent, Kent Business School (UNIKENT)
Canterbury
Kent CT2 7NZ
United Kingdom
Contact person: Sophia Davidova
E-mail: s.davidova@imperial.ac.uk

Catholic University Leuven (KU Leuven)
LICOS Centre for Institutions and Economic Performance & Department of Economics
Deberiotstraat 34
3000 Leuven.
Belgium

Contact person: Johan Swinnen
E-mail: jo.swinnen@econ.kuleuven.be

Corvinus University Budapest (CUB)
Department of Agricultural Economics and Rural Development
Fövám tér 8
1093 Budapest
Hungary
Contact person: Csaba Csáki
E-mail: csaba.csaki@uni-corvinus.hu

Warsaw University, Department of Economic Sciences (WUDES)
Dluga 44/50
00-241 Warsaw
Poland
Contact person: Dominika Milczarek-Andrzejewska
E-mail: milczarek@wne.uw.edu.pl

University of Ljubljana (UL)
Groblje 3
1230 Domzale
Slovenia

Contact person: Luka Juvančič
E-mail: luka.juvancic@bfro.uni-lj.si

University of Newcastle upon Tyne, Centre for Rural Economy (UNEW)
Newcastle upon Tyne NE1 7RU
United Kingdom

Contact person: Matthew Gorton
E-mail: matthew.gorton@newcastle.ac.uk

CONTENT

LIST OF TABLES

LIST OF ABBREVIATIONS

BRC	British Retail Consortium
CAP	Common Agricultural Policy
CEE	Central and Eastern Europe
CEECs	Central and Eastern European Countries
ESU	European Size Unit
EU	European Union
€	Euro
FADN	Farm Accountancy Data Network
FSS	Farm Structure Survey
GDP	Gross Domestic Product
HH	Household head
MS	Member State
NMS	New Member States
NRDP	National Rural Development Programme
NUTS	Nomenclature of Territorial Units for Statistics
OECD	The Organisation for Economic Co-operation and Development
PPP	Purchasing Power Parity
SCARLED	Structural change in agriculture and rural livelihoods
SF	Subsistence farming
SSF	Semi-subsistence farming
SGM	Standard Gross Margin
USD	US Dollars
UAA	Utilised Agricultural Area
WP	Work package

1 INTRODUCTION

Twenty years after the downfall of socialist regimes in Central and Eastern Europe (CEE), the farm structure in most of the 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 in the NMS are subsistence or semi-subsistence with limited or no market participation (Fritzsch *et al.*, 2009). 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 could, therefore, be regarded as a favourable development. However, on the other hand, subsistence (SF) and semi-subsistence farming (SSF) may play an important role as a safety net in rural areas and provide a substantial share of the food needs of poor agricultural households. In order to inform policies about the need, or otherwise, to stimulate the commercialisation of subsistence and semi-subsistence farmers it is necessary to investigate the role of subsistence farming in the NMS.

This deliverable consists of two main components. First, it evaluates the role of subsistence farming for the total incomes of agricultural households in selected NMS. Particular attention is paid to the contribution of subsistence farming to assessments of poverty. 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 on subsistence production of each cluster of agricultural households is assessed. The typology provides the basis for engaging in a wider policy debate regarding agricultural households and the appropriateness of the CAP for the NMS. The two aspects of the research are linked through the share of the monetary value of subsistence production in total household incomes being used as one of the cluster profiling variables.

The data of this research was collected through a survey conducted within SCARLED WP4[1] during autumn 2007 and winter 2008 in the SCARLED NMS partner countries (Bulgaria, Hungary, Poland, Romania and Slovenia). The unit of analysis in this research is the farm household. For the purposes of SCARLED research, the agreed definition of the household is that of a single person or several individuals, not necessarily related, who live together, share meals and pool some or all of their income, and who cultivate land or keep livestock. The rationale behind the selected unit of analysis as opposed to a farm is due to the fact that subsistence households are both producers and consumers of their own output. This "dual economic nature" (Ellis, 1993, p.7) precludes the standard economic assumption of profit maximising producers.

This deliverable is structured as follows. Chapter 2 provides an overview of the definitional issues of subsistence farming, and theories of non-market participation

[1] WP4: "Design and implementation of a survey instrument"

of subsistence farmers are briefly discussed. The prevalence of subsistence farming in the selected NMS is subsequently described and relevant studies of subsistence farming in transition economies are reviewed. Chapter 3 presents the methodology applied and the study sample is described in Chapter 4. The results from valuation of subsistence production and its importance for poverty assessments are presented in chapter 5, together with the typology of rural farm households resulting from factor and cluster analysis. Chapter 6 concludes.

2 DEFINITIONS AND PATTERNS OF SUBSISTENCE FARMING IN THE NMS

2.1 Subsistence farming defined

Subsistence farms are generally small, and associated with a low degree of market participation and a high production for own consumption. However, there is no consensus definition of subsistence farming although many 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; and (iv) the proportion of output sold is low. In the NMS, farm households normally produce for their own needs but also sell to the market (Mathijs and Noev, 2004), and are therefore often referred to as semi-subsistence. This is not only a case in EU 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). The problems with defining subsistence and semi-subsistence lie in the arbitrary element of fixing thresholds (Brüntrup and Heidhues, 2002) and that subsistence can be considered both from a consumption and a production point of view (Mathijs and Noev, 2004).

Generally, a definition of subsistence farming may depart from three different criteria: *physical measures, economic size* and *market participation*.

Physical measures, such as agricultural land, volume of inputs and number of livestock, can define subsistence through thresholds. McConnell and Dillon (1997) have suggested that 0.5-2.0 ha of cultivated land might be a good proxy indicator for semi-subsistence farms. However, they point out the weakness of land size as a general indicator, since fertility of land may differ and productivity is influenced by natural, social and economic conditions. In the EU the prevailing opinion is that farms with utilised agricultural area of less than 5 ha are small. They however may or may not be semi-subsistence.

Economic size thresholds are widely applied for statistical purposes, not the least by Eurostat. The Farm Accountancy Data Network (FADN) uses economic size as the criterion for distinguishing subsistence farms from commercial farms. The economic size of farms is expressed in terms of European Size Units (ESU).[2] FADN only covers commercial farms, and the thresholds for what is considered a

[2] The ESU is used to express the economic size of an agricultural holding or farm, corresponding to a standard gross margin (SGM) of €1200 (http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/European_size_unit_, accessed 15-04-2010). 1 ESU roughly corresponds to either 1.3 hectares of cereals, or 1 dairy cow, or 25 ewes, or equivalent combinations of these (http://statistics.defra.gov.uk/esg/asd/fbs/sub/europe_size.htm, accessed 18-06-2008).

commercial farm vary between countries because of the different farm structures across the EU. Currently, the thresholds for the NMS are >1 ESU for Bulgaria and Romania, and >2 ESU for Hungary, Poland and Slovenia.[3] In the EU Farm Structure Surveys (FSS) and Eurostat's corresponding series "Statistics in Focus", farms smaller than 1 ESU are labelled "subsistence" (Eurostat, 2007b; a, 2008b; a, 2009). As Eurostat labels farms <8 ESU "small farms" it is assumed here that farms 1<8 ESU are semi-subsistence.

In addition to the above, the EU also employs a definition based on a *market participation* criterion for defining semi-subsistence farms. Council Regulation on Support for Rural Development by the European Agricultural Fund for Rural Development (EC) No. 1698/2005 Article 34 (1) defines semi-subsistence farms as "agricultural holdings which produce primarily for their own consumption and also market a proportion of their output". As this definition lacks set thresholds for consumption and sales, individual Member States (MS) adopted their thresholds in the National Rural Development Programmes (NRDPs) concerning the eligibility for support of semi-subsistence farms undergoing restructuring (measure 141), which in turn are widely based on economic size. For example, Bulgaria defined semi-subsistence farms as farms within the size band of 1-4 ESU, Hungary 2-4 ESU and Romania 2-8 ESU.

Within the academic literature, definitions based on a market participation criterion are more common than economic size measures. The market participation criterion is still arbitrary but offers a straightforward approach to the classification of farms. This can be done either from the consumption or production point of view.

One approach is to focus on the share of household consumption covered by own production and to assess to what extent subsistence production can cover household needs (e.g. see Ellis, 1993). However, a consumption-based approach can be misleading; even a large and commercially-integrated farming operation may still cover a substantial part of household food needs from a small share of total output (Davidova *et al.*, 2009).

The production side approach has been widely applied since Wharton (1969) first addressed the problems caused by non-uniform definitions of subsistence farming. Focusing on agricultural output markets, he stressed that farm households can sell everything between zero and 100 per cent of their agricultural output. At the two extremes are purely subsistence (autarkic) and purely commercial operations with different mixes in-between. With regard to this continuum, he 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. Moreover, he defined "subsistence production" as a situation where the agricultural activities of the household are directed towards meeting consumption needs, without any or few market

[3] http://ec.europa.eu/agriculture/rica/methodology1_en.cfm#dotfoo (accessed 16-10-2009).

transactions. Several authors (e.g. Lerman, 2001; Kostov and Lingard, 2004) utilise Wharton's approach.

For the purposes of this deliverable a production side definition of subsistence and commercial oriented farming respectively, is adopted as follows:

- Households selling less than 50 per cent of their agricultural output
  → *Subsistence oriented*
- Households selling 50 per cent or more of their agricultural output
  → *Commercially oriented*

2.2 Theories of non-market participation: a brief summary

Drawing on the selected definition of subsistence agriculture based on a market participation criterion, three main theories which seek to explain the low market participation of subsistence oriented households can be discerned: transaction costs, inability to meet agricultural standards, and non-pecuniary benefits of consuming own produced food.

Transaction costs refer to the expenses incurred in economic exchange, of which the main forms are search, bargaining and enforcement costs. Goetz (1992) demonstrates that proportional transaction costs lower the prices received by sellers and raise the price effectively paid by buyers, generating a 'price band' within which some producers find it unprofitable to either sell their output or buy. An increase in such transaction costs, which may be high in emerging and turbulent markets (Kostov and Lingard, 2002), leads to an expansion of the price band. Moreover, for buyers the transaction costs of sourcing a particular quantity of raw material from a mass of small-scale producers will be significantly higher than from a small number of larger suppliers (Swinnen, 2005; Gorton *et al.*, 2006). Key *et al.* (2000) develop Goetz's (1992) model by also considering fixed transaction costs (invariant to the quantity traded). Applying their theoretical framework to the production and sale of corn in Mexico, they found that both fixed and proportional transaction costs affect farm household marketing and production behaviour. They conclude that attempts to stimulate commercialisation should focus on policies to reduce transaction costs, by reducing the expense of transportation and stimulating co-operative marketing.

A second approach focuses on how agricultural standards may act as a barrier to market participation. Agricultural standards can relate to quality (e.g. organoleptic, cosmetic), safety, authenticity, and to the production process (e.g. organic) (Reardon, 2006). Traditionally public sector agents set and enforced such standards but private standards, either third party arrangements, such as GlobalGAP or the British Retail Consortium (BRC), or buyer specific standards have become increasingly prominent in international food supply chains (Busch, 2000; Hatanaka *et al.*, 2005; Jaffee and Henson, 2005; Reardon, 2006). Studies of

developing countries suggest that the imposition of tighter private standards, most commonly GlobalGAP, may lead to a concentration of the supply base with a significant reduction in sourcing from small farms (Dolan and Humphrey, 2000; Hernández *et al.*, 2007). While exclusion of small-scale producers has not occurred in all cases (Narrod *et al.*, 2009), the costs of gaining certification may be prohibitive for those with poor access to credit and a small production volume. As the penetration of supermarkets increases in developing and transitional economies, the market for non-certified produce diminishes (Dries *et al.*, 2004; Reardon, 2006) and may, in certain cases, disappear entirely.

Some producers may gain satisfaction (non-pecuniary benefits) from growing and consuming their own food. In North America and Western Europe this is often associated with hobby farming (Daniels, 1986; Holloway, 2002). For peasant economies, Mellor (1969, p. 220) labels it subsistence mindedness - farmers that 'attach special value to crops and livestock produced for home use relative to production for sale'. Price signals and transactions costs may be relatively unimportant in explaining the production and marketing decisions of such farmers.

2.3 Subsistence farming in the NMS

As mentioned in Section 2.1, it is generally agreed that subsistence farm households cultivate small land areas. McConnell and Dillon (1997) argue that farms below 2 ha could be defined as semi-subsistence, although NMS are applying economic-size thresholds as an eligibility criteria for targeted policy measures aimed at commercialisation of famers producing primarily for own consumption. This section illustrates subsistence farming in the NMS from these three criteria of physical measures, economic size and market participation, respectively.

In order to understand why subsistence farming is more widespread in the NMS compared to EU-15, it is important to first consider the differences in farm structure based on physical size (Table 1).

Table 1. Shares of total number of holdings by farm size (%, 2007)

Farm size (UAA*)	Bulgaria	Hungary	Poland	Romania	Slovenia	EU-15
0<2	87	82	44	65	25	34
2<5	8	8	24	25	34	21
5<20	3	7	26	9	37	23
20<	2	4	5	1	4	22
Total	*100*	*100*	*100*	*100*	*100*	*100*

* Utilised Agricultural Area. 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)

According to McConnell and Dillon's (1997) definition, a majority of farmers in Bulgaria, Hungary and Romania are semi-subsistence. In the cases of Poland and Slovenia, who did not experience the same collectivisation of land under communism, the farm structure is more similar to the one of EU-15. Slovenia even has a lower share of semi-subsistence farmers in comparison to the average for EU 15. However, the difference in farm structure between Poland and Slovenia, on the one hand, and EU-15, on the other, becomes apparent when considering farms larger than 20 ha. While 22 per cent of farms in EU-15 exceed 20 ha the same figure for Slovenia is only 4 per cent and for Poland 5 per cent.

Another measure of farm size is the ESU, measuring a holding's economic size irrespective of its land area. Eurostat considers farms below 8 ESU to be small farms, of which farms <1 ESU are defined as subsistence and farms 1<8 ESU presumably semi-subsistence. 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 differently to the EU-15, the farm structure in the studied NMS, with the exception of Slovenia, 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. In Slovenia, the majority of farms are instead between 1 and 8 ESU (semi-subsistence). In Slovenia, semi-subsistence farms are important for land management, as these farms cultivate 50.1 per cent of the total UAA. The total UAA of farms <1 ESU is generally low, particularly in Bulgaria and Hungary where more than three quarters of holdings only manage 4 to 6 per cent of UAA.

At the other end of the spectrum the picture is reversed with a minor share of farms cultivating extensive shares of agricultural land. For example, 2.3 per cent of Bulgarian farms are larger than 8 ESU but their land assets correspond to 83.2 per cent of total UAA. Romania differs from the other countries in this respect. Still dominated by farms below 1 ESU and with only a fraction of holdings exceeding 8 ESU, the UAA is fairly evenly distributed across the three ESU classes.

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

	Bulgaria		Hungary		Poland		Romania		Slovenia		EU-15	
ESU	% 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	% 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	15.7	3.5
1<8	21.6	10.8	17.9	13.7	36.9	38.0	21.4	31.3	66.0	50.1	44.9	11.2
8≤	2.3	83.2	4.6	82.1	10.3	51.6	0.6	37.7	15.6	44.3	39.4	85.3
Total	*100.0*	*100.0*	*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)

If subsistence farming instead is defined based on a market participation criterion, and production mainly for own consumption defines subsistence oriented farms, the picture changes. Table 3 gives an overview of the share of holdings producing mainly for own consumption within the total farm structure, and their

corresponding shares of UAA and ESU. The table displays data for the selected NMS only, as these statistics are not available for all EU-15. 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.

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

Country	No. of holdings (%)		UAA (%)		SGM (%)	
	2005	2007	2005	2007	2005	2007
Bulgaria	68.8	69.7	11.7	6.5	22.1	15.4
Hungary	83.5	83.4	19.6	17.0	24.1	21.1
Poland	41.0	38.0	14.3	13.8	12.4	11.3
Romania	80.9	80.7	42.0	41.4	54.5	51.6
Slovenia	68.4	60.5	42.7	32.4	31.2	28.6

Source: Eurostat FSS data (2005 and 2007)

Table 3 shows that the share of subsistence oriented farmers has remained fairly constant between the two years 2005 and 2007, except for in Slovenia where this decreased with 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 the small size of these farms, both in terms of utilised land areas and economic size. For example in Hungary, 83.4 per cent of farmers were subsistence oriented in 2007 but the aggregated UAA of all these farms was only 17 per cent, and their total Standard Gross Margin (SGM)[4] 21.1 per cent of the country total. Between the two time periods, there has been a larger relative decline of Bulgarian subsistence oriented farmers' SGM and UAA in comparison to the other countries, which have only experienced minor decreases.

To conclude, the extent of subsistence/semi-subsistence farms within the farm structure is sensitive to the definition applied. Table 4 gives an overview of subsistence/semi-subsistence farms in the selected NMS according to the different definitions discussed. The table also shows (in parentheses) how the shares of subsistence/semi-subsistence farms change relative to the market participation criterion, which is the selected definition for subsistence oriented farms in this research.

[4] The concept of Standard Gross Margin (SGM) is used to determine the economic size of farms. which is expressed in terms of European Size Units (ESU). The SGM of a crop or livestock item is defined as the value of output from one hectare or from one animal less the cost of variable inputs required to produce that output (http://ec.europa.eu/agriculture/rica/methodology1_en.cfm, accessed 14-04-2010).

Table 4. Prevalence of subsistence and semi-subsistence farms within the total farm structure (% of total number of farms, 2007)

	Production mainly for self-consumption	UAA <2 ha (semi-subsistence)		ESU <1 (subsistence)		ESU <8 (subsistence & semi-subsistence)	
Bulgaria	69.7	86.9	(+17.2)	76.1	(+6.4)	97.7	(+28.0)
Hungary	83.4	81.8	(-1.6)	77.5	(-5.9)	95.4	(+12.0)
Poland	38.0	44.3	(+6.3)	52.8	(+14.8)	89.7	(+51.7)
Romania	80.7	65.2	(-15.5)	78.0	(-2.7)	99.4	(+18.7)
Slovenia	60.5	24.8	(-35.7)	18.4	(-42.1)	84.4	(+23.9)

Source: Eurostat FSS data (2007)

2.4 Studies of subsistence farming in transition economies

While subsistence farming in developing countries has been widely researched for decades, subsistence farming in transition economies started to attract research interest in the late 1990s. Subsistence farming in a developing country context is still the dominating field of research and literature on subsistence farming in transition economies is still fairly scarce.

The perception of subsistence farming in the literature has for a long time been negative, with subsistence farming being characterised by a low external input level and low productivity, and perceived as being inefficient and constituting an impediment to economic growth (Brüntrup and Heidhues, 2002). Moreover, subsistence has been associated with poverty and low levels of technology (Mathijs and Noev, 2002). During the past years a contrasting view of subsistence farming has emerged, arguing that it may have positive effects on transition economies. Brüntrup and Heidhues (2002) put forward arguments about the positive impacts of subsistence farming, e.g. as a way for people to survive under difficult and risky conditions and to cope with high transaction costs, and as such having an important stabilising role in fragile economies. Kostov and Lingard (2004) also emphasize the stabilising role of subsistence farming and its positive impacts on agriculture in the case where there is no demand for the resources it employs by the commercial sector.

A few studies investigate the factors encouraging, and impeding, commercialisation of subsistence farmers in CEE. Age is one of them. Sarris *et al.* (1999) find potential for commercialisation among small-scale farms headed by younger farmers, but at the same time argue that this development is constrained by technological and financial factors. As for older farmers, Mathijs and Noev (2002; 2004) observe that age can be an impediment to commercialisation, where elderly landowners lack incentives to sell their land to more efficient users, resulting in a thin land market. As discussed in section 2.2, transactions costs and risk aversion are also found to be important barriers to commercialisation (Kostov and Lingard, 2004). Cooperation among farmers may help overcome transactions costs barriers and facilitate commercialisation in improving access to machinery and markets (Mathijs and

Noev, 2002; Balint and Wobst, 2006). On a macroeconomic level, Kostov and Lingard (2002) argue that the collapse of institutions, macroeconomic instability and land reform all contributed towards the increase in small-scale subsistence farming following the collapse of centrally planned economies. For this reason, stabilisation of the economy and strengthening of institutions may also be of importance for subsistence farmers wishing to commercialise their agricultural activities.

Findings on the relationship between commercialisation and off-farm employment are inconclusive. Kan *et al.* (2006) and Tudor and Balint (2006) recently studied this issue with applications to Georgia and Romania, respectively. Kan *et al.'s* (2006) results support the notion that the level of farm output affects labour market participation positively. Furthermore, the size of land holdings impacts positively on market participation due to its indirect effect on the level of farm output (*ceteris paribus*). In this study education affects market participation negatively, which is explained by its indirect positive effect on off-farm employment and off-farm incomes. Tudor and Balint (2006) assess the relationship between agricultural sales and off-farm employment at the regional level. They find that a low level of off-farm employment is associated with higher involvement in agriculture. The authors assert that low incomes from off-farm employment lead to households producing for subsistence needs, whereas this pressure is eased for households with higher off-farm incomes. This suggests that households with off-farm employment can sell larger shares of their output, favouring commercialisation. Moreover, the income from off-farm work can be used to invest in agriculture and/or facilitate access to credit, thus making possible the mechanisation of farming practices and the purchasing of production factors (including hiring labour and buying land freed up by people abandoning agriculture in favour of off-farm waged employment). In turn, these investments favour specialisation and commercialisation. As a result, commercialisation of agriculture tends to be higher in areas with greater off-farm employment.

2.5 Concluding remarks

This brief review of previous studies identifies relevant variables for explaining the behaviour of subsistence oriented farms and their potential transition to more commercially oriented agriculture. These include farmers' age and education, proxies for farmers' co-operation (e.g. joint use of farm machineries), production technology, level of farm output, and off-farm employment. These factors are relevant for the analysis of barriers to, and facilitators for, commercialisation of subsistence farmers, which is the focus of SCARLED Deliverable 6.6 (D6.6: Fredriksson *et al.*, 2010).

Nevertheless, little is still known about the motivations, objectives and behaviour of subsistence farmers in transition economies and the importance of subsistence farming for rural household well-being. The macroeconomic and political environment in CEE has stabilised, and real incomes, overall, risen since the mid-1990s. Under these circumstances, it is possible that subsistence farming instead of

being a survival strategy has become a voluntary choice. This is an area that has not yet been researched. Without understanding the reasons for the persistence of subsistence production, it is not possible to design policies which would be effective in shifting subsistence farmers towards commercial agriculture. In order to provide a better understanding of the role of subsistence farming in the NMS twenty years after the start of transition, it is crucial to investigate *why* farm households engage in subsistence production. Part of this understanding is likely to come from the analysis of subsistence farming in relation to incomes as a possible safety net, and as a source of additional household cash income.

3 METHODOLOGY

The study involved three inter-related methodological stages. The first stage focused on questionnaire design and data collection. The next step included the valuation of unsold output and the estimation of its contribution to total household incomes. The newly created variable of total income including the valuation of subsistence production was used in the third step, which included factor and cluster analysis to identify homogeneous groups of farm households and subsequently to investigate whether there were systematic characteristics of households that were more dependent on subsistence production. This step was also used for the formulation of more focused policy implications and conclusions.

3.1 Survey instrument and data collection

The analysis of subsistence farming in the NMS is constrained by the lack of adequate data. The FADN surveys do not include farms smaller than 1 ESU and differences in national statistics make it difficult to carry out cross-country analysis. The empirical analysis for this research is therefore based on entirely new data collected within the framework of the SCARLED project (WP4).

A questionnaire was devised to survey agricultural households in the five selected EU NMS: Bulgaria, Hungary, Poland, Romania and Slovenia. As mentioned above, for the purposes of the SCARLED project a farm household is defined as one or several individuals, not necessarily related, who live together, share meals and pool some or all of their income, and who cultivate land or keep livestock (including production from a house garden or yards belonging to the house). Only farm households that were engaged in agricultural production in both 2006 and 2003 or in either of these two years were included in the survey sample. Although the information requested for 2003 was less detailed than that for 2006, the survey of the two time points allowed for the identification of households that entered or exited agriculture between 2003 and 2006. Participation in the survey was determined by asking initial filter questions.

The questionnaire solicited information on household demographics, incomes and sources of incomes, factors of production, agricultural output and variable inputs (in quantities and value). In addition, answers to qualitative statements on 5-point Likert scales generated insights to respondents' motivations and attitudes, notably with regards to farming, commercialisation, and off-farm employment.

As for this research market participation and the use of subsistence production to cover household food needs are of central importance, households were first asked to estimate how much of their total output they sell to the market (as a share) and second, to estimate how large a share of their food consumption is covered by their own production. The survey was implemented through face-to-face interviews using local enumerators.

Three regions in each of the five countries surveyed 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. Eurostat data at the NUTS3 level were used as a basis for this selection.[5] The survey targeted rural areas, and for this reason the regions of the capital city and other large cities were excluded from the selection with the exception of Ljubljana, which does not constitute a sole NUTS3 region. 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). In the villages, households were selected at random.

3.2 Valuation of output and construction of total household income

The valuation of total agricultural output depended on using actual household selling prices for the crops, livestock and processed products included. In cases where the household consumed all output produced, crops were valued using a weighted average market 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 calculated from the dataset were applied. Where reference prices were missing from the dataset, prices were taken from national statistics.[6]

An identical procedure was used to value unsold output (subsistence production). The aggregate value of subsistence production was added to total cash incomes to construct a variable labelled total household income. Product by product, non-marketed output was valued at market prices as a proxy for opportunity costs. If a household sold a portion of their output, 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. If the household did not report any sales of the product in question, the valuation procedure as explained above in relation to the total output was applied. Following the above rules, the total share of sales in agricultural output was calculated and used to correct for some discrepancies in the figures provided by respondents.[7]

[5] The Nomenclature of Territorial Units for Statistics (NUTS) is a hierarchical classification, according to which each Member State is divided into a whole number of NUTS 1 regions, each of which is in turn subdivided into a whole number of NUTS 2 regions and so on. (http://ec.europa.eu/eurostat/ramon/nuts/basicnuts_ regions_en.html, accessed 02-02-2010)

[6] 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.

[7] The following rules for handling discrepancies were applied:

(i) When the stated share of sales was 100 per cent, the calculated share of sales was less than 100 per cent and the household stated consumption from own production, the calculated share of sales was applied.

(ii) When the stated share of sales was zero but the calculations product by product indicated some sales, the calculated share of sales was applied.

(iii) When the stated share of sales was missing, the calculated share of sales was used.

(iv) In addition, when both the stated and calculated share of sales were 100 per cent, but the household reported a share of food consumption from own production, the consumption from own production was set to zero.

Two things need to be pointed out with respect to this methodological step. First, subsistence production is not limited to food for human consumption but also includes inputs in production. This explains why the value of subsistence production in some cases may exceed what would be a reasonable per capita value of yearly food consumption. Second, the data at hand did not allow for an accurate calculation of production costs meaning that incomes, including subsistence production might be overstated. However, assuming that smallholdings and subsistence oriented farmers use family labour and predominantly self-produced inputs (e.g. seeds, manure), this is likely to have a small impact on the assessment of total incomes for these types of farms. This assumption might be too strong for commercial operations employing hired labour and using purchased inputs in production. Still, this type of farm is not widespread in our sample and considering that these farmers assign little importance to subsistence production as contributor to household welfare, the overestimation of the contribution of subsistence production to the incomes of commercially oriented households is unlikely to substantially affect poverty assessments.

3.3 Identifying poor households

Following a study by Petrovici and Gorton (2005) on Romania, an objective of the research was to investigate whether the monetary value of subsistence production is of greater importance for poor households. 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 per cent of the national equivalised median income.[8] 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. As the data from the five countries were pooled together, all income indicators were converted into Euros using Eurostat purchasing power parities (PPP) for 2006, the reference year for the data collected.

The use of a relative as opposed to an absolute measure of poverty (e.g. USD 1 per day), is grounded on the theory of relative deprivation originating from Runciman (1966). The literature on relative deprivation argues that it is not the absolute income or consumption that is the carrier of welfare, but the relative economic position of an individual/household. In a critical review on the welfarist rationale for relative poverty lines, Ravallion (2008) argues that while absolute measures of poverty may be preferable in a developing country context, the importance of relative measures increases as a country becomes more developed. This justifies the selection of the at-the-risk-of-poverty as poverty indicator, since the NMS are developed, and not developing, countries.

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

With respect to incomes and poverty assessments, for the reasons pointed out in section 3.2, there is a possibility that incomes are overestimated; notably for larger farms as production costs are assumed to increase with farm size. As a result, the number of households below the poverty line may be somewhat be underestimated.

3.4 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.*, 2006). Factor analysis preceded the cluster 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 assesses whether the data matrix has sufficient correlation to justify the application of factor analysis. Bartlett's test of sphericity judges the significance of the correlation matrix in order to reject the null hypothesis that the correlation matrix is the identity matrix (Hair *et al.*, 2006).

The factors formed the basis of the cluster analysis. The latter followed a two-stage approach. In the first step, hierarchical cluster analysis is used to identify the number of clusters. In the second step, the non-hierarchical *k*-means approach is used to fine tune cluster membership. The analysis is linked by taking the centroids from the hierarchical clustering as seeding points for non-hierarchical clustering. The hierarchical method is better for identifying outliers and the number of clusters, and the non-hierarchical for the final membership of clusters. This combined procedure allows one to take maximum benefit of the advantages associated with hierarchical and non-hierarchical methods, while at the same time minimising the drawbacks (Punj and Steward, 1983; Milligan, 1996).

As the objective here is to produce a typology of agricultural households, the above review of previous studies related to subsidence farming and wider analysis of the strategies of family farms were used to identify suitable variables (Munton, 1990; Evans, 2009). Evans (2009), drawing on Munton (1990), argues that farm households have seven main inter-related elements that can be adjusted. The seven elements are: labour, 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: time spent on-farm by the head of the household, time spent by the household head in non-farm wage employment, size of largest plot, total cultivated area, distance to largest plot, distance to most distant plot, distance to nearest urban centre and the monetary value of subsistence production as a share of total household income.

The validation of the clusters depends on an array of additional variables. These include variables characterising the head of the household (e.g. age and education); household characteristics (number of household members, equivalised income per capita (PPP€) with and without the valuation of subsistence production; share of self-produced food in total food consumption); farm characteristics (share of sales in agricultural output, value of agricultural equipment identified by respondent assessment of the sale value). The incidence of poverty per cluster is also considered. Profiling of the clusters also covers labour allocation (having household members engaged in wage employment and/or working as self-employed outside agriculture), and capital and technology use (farming with agricultural machinery; with a combination of machinery and draft animals; or manually). 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 SAMPLE DESCRIPTION

The sample underlying this analysis consists of 1012 observations of NMS households which were all producing agricultural commodities in 2006. This figure comprises 214, 165, 199, 251 and 183 responses from Bulgaria, Hungary, Poland, Romania and Slovenia respectively. Table 5 provides an overview of the key household and production characteristics of the pooled five country sample used in the analysis.

Table 5. Descriptive statistics of the five country pooled sample (2006)

	Min	Max	Mean	Std. Dev.
Age of household head (HH) (years)	18	91	54.3	13.141
Education level of HH[1]	1	5	3.2	0.874
Time spent on-farm by HH (%)	0	100	74.3	35.995
Time spent on non-farm wage employment by HH (%)	0	100	18.8	32.144
Total number of household members	1	9	3.5	1.580
Equivalised household size	1	4.8	2.2	0.707
Total cultivated land area (ha)[2]	0	132	7.8	12.151
Size of biggest plot (ha)	0	67	2.7	4.800
Distance to most distant plot (km)	0	80	3.8	5.400
Distance to biggest plot (km)	0	45	2.4	3.326
Distance to nearest urban centre (km)	4	78	23.7	18.740
Total value of production (PPP€)	70	215 707	14 374	22030.077
Total value of sales (PPP€)	0	215 707	9 926	18668.749
Total value of subsistence production (PPP€)	0	209 478	4 448	8932.772
Total cash income (PPP€)	0	119 337	17 000	15500.275
Equivalised income per capita without subsistence production (PPP€)	0	52 264	7 910	6887.373
Equivalised income per capita incl. subsistence production (PPP€)	183	68 627	9 962	7860.460
Value of agricultural equipment (PPP€)	0	680 343	15 691	36019.557
Share of sales in output (%)	0	100	50.7	32.726
Share of food consumption from own production (%)	0	100	44.5	26.569
Subsistence production contribution to total income (%)	0	100	22.6	18.573

[1] Five education levels were recorded: 1 - No schooling, 2 - Primary school, 3 - Middle school, 4 - High school and 5 - University degree.
[2] The case of 0 area cultivated is explained by the situation where the household only keeps livestock and does not cultivate crops.
Source: Sample of 1012 observations extracted from the SCARLED database

As evident in Table 5, the sample encompasses from very small to relatively large holdings measured by land area, covering the whole spectrum from fully subsistence (0 per cent sales) to fully commercial (100 per cent sales). Also, the survey includes rural agricultural households who do not consume any of their produce themselves, to households who claim they are entirely self-sufficient in food. The mean farm size is 7.8 ha and most farm within their local area – the average distance to household's largest plot is 2.4 km. The value of agricultural equipment, output, sales, subsistence production and incomes vary substantially around the mean values, indicated by large standard deviations.

5 RESULTS

5.1 The importance of subsistence farming for real agricultural household incomes

The valuation of unsold output (subsistence production) provides an indication of the contribution of subsistence farming to total household income. Table 5 details that for the sample as a whole, on average, the equivalent value of subsistence food production is PPP€ 4,448 per household, accounting for on average 22.6 per cent of the total incomes of households. Adjusting for household size, equivalised income per capita in 2006 excluding and including subsistence production was PPP€ 7,910 and PPP€ 9,962 respectively. Turning to the measure of poverty, 15.1 per cent of households can be classified as poor excluding the valuation of subsistence farming (Table 6). Valuing subsistence production has a significant effect on the numbers classified as living at-the-risk of poverty. This adjustment leads to only 7 per cent of the sample being classified as below the poverty line. Assessments of rural poverty are therefore sensitive to the valuation of subsistence production and production for own consumption does make a significant contribution to rural household welfare for a non-negligible share of households.

Table 6 Household distribution below and above the poverty line by country (%)

	Poverty line excluding subsistence production		Poverty line including subsistence production	
	Below	Above	Below	Above
Bulgaria	26.6	73.4	8.9	91.1
Hungary	11.5	88.5	9.1	90.9
Poland	9.5	90.5	2.0	98.0
Romania	5.2	94.8	1.6	98.4
Slovenia	24.6	75.4	15.8	84.2
Sample total	*15.1*	*84.9*	*7.0*	*93.0*

Source: Sample of 1012 observations extracted from the SCARLED database

Focusing on the importance of subsistence production at the country level, the analysed NMS show large differences, ranging from very little importance (Hungary) to a substantial impact on the rural poor (Bulgaria) (Table 6). In Bulgaria, where the valuation of subsistence production has the largest effect, almost two thirds of the poor households are shifted from below to above the poverty line when this production is taken into account. The valuation of subsistence production also has a large impact on Slovenian households by reducing the share of poor households from 24.6 per cent to 15.8 per cent. For these two countries, subsistence production is very important but not enough to fully eradicate poverty. This is however the case for Poland and Romania, where the value of subsistence production reduces the already low shares of agricultural households below the poverty line to less than 2 per cent. In Hungary on the other hand, valuing subsistence production has only a modest effect in shifting households above the poverty line. It should be stressed, however, that the analysis presented in Table 6

relates to relative poverty lines, which vary significantly between countries. For example, most households identified as being at-the-risk of poverty in Slovenia would not be considered poor in a Bulgarian context. What the table shows is only the relative incidence of poverty in rural areas in comparison to national median incomes.

Another indicator of the economic importance of subsistence production is the share of subsistence production in total household incomes. Table 7 displays this share for three categories of households: i) Households who are below the poverty line also after adding the value of subsistence production to cash incomes; ii) Households who are shifted from below to above the poverty line after the value of their subsistence production has been added to their cash incomes; and iii) Households whose cash incomes alone are sufficiently high to place them above the poverty line.

Table 7 Subsistence production contribution to total income (%)

	Bulgaria	Hungary	Poland	Romania	Slovenia	Sample mean
Below the poverty line	32.9	17.6	16.6	59.7	18.5	24.4
Shifted from below to above the poverty line	47.6	30.0	45.7	57.9	30.0	44.1
Above the poverty line	24.6	5.3	22.7	31.5	9.3	20.4

Source: Sample of 1012 observations extracted from the SCARLED database

The table shows that there is great variation in subsistence production income contribution, both across the three household categories and across countries. Subsistence production contributes the most to rural household incomes across the board in the poorest NMS in the sample: Romania and Bulgaria, and particularly for households below the poverty line. In the richest NMS in the sample - Slovenia and Hungary – although below the sample mean, subsistence production is contributing significantly to incomes for households with cash incomes below the poverty line: roughly 18 per cent for households always below the poverty line and 30 per cent for households shifted above the poverty line. In contrast, subsistence production contributes very little to incomes for those households in these two countries whose cash incomes are above the poverty line. In Poland, the contribution pattern differs somewhat from the other countries, in that subsistence production income contribution is more important for households always above the poverty line compared to those always below. For households below the poverty line, the income contribution of subsistence production is similar to that of Hungary and Slovenia. However, for households shifted above and always above the poverty line, the income shares are similar to those of Bulgaria.

5.2 Factor and Cluster Analysis

As discussed in the methodology section, factor analysis preceded the cluster analysis. A four-factor solution was adopted, choosing the factors that present an eigenvalue greater than one (Table 8). This solution explains 76.7 per cent of the total variance in the data set, which is satisfactory (Hair *et al.* 2006). The cut-off

for interpretation purposes is factor loadings greater or equal to 0.5 on at least one factor. Two statistics confirmed the appropriateness of the factor analysis. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.529, indicating that the data matrix had low but sufficient correlation to justify the factor analysis (Hair *et al.* 2006). Bartlett's test of sphericity was statistically significant at the 1 per cent level, implying that the hypothesis of the correlation matrix being the identity matrix could be rejected. The four factors labelled income diversification, farm size, land fragmentation and subsistence reliance formed the basis for the cluster analysis, which in turn resulted in a four cluster solution (Table 9).

Table 8. Rotated Component Matrix (Factor Analysis)

	Income diversification	Farm size	Land fragmentation	Subsistence reliance
– Time spent on-farm by HH (%)	**.941**	.020	-.015	.096
– Time spent on non-farm wage employment by HH (%)	**-.940**	-.035	-.039	-.056
– Size of biggest plot (ha)	-.009	**.889**	.022	-.039
– Total cultivated land area (ha)	.063	**.866**	.146	.049
– Distance to biggest plot (km)	-.034	.009	**.886**	-.051
– Distance to most distant plot (km)	.060	.164	**.859**	.067
– Distance to nearest urban centre (km)	.007	.036	.114	**.784**
– Subsistence production contribution to total income (%)	.123	-.028	-.102	**.750**

Source: Sample of 1012 observations extracted from the SCARLED database

Table 9. Cluster Analysis – Cluster profiling variables

	Large comm.	Part-time	Small comm.	Small subs.	Sample total	4-cluster F-value	Sig.	
N =	*68*	*283*	*418*	*243*	*1012*			
Factor 1: Income diversification								
– % time on-farm	77.5	25.5	96.1	92.6	74.2	902.242	0.000	***
– % time non-farm wage employment	12.2	61.8	0.4	2.3	18.8	790.529	0.000	***
Factor 2: Farm size								
– Size of biggest plot (ha)	10.6	1.9	2.4	2.0	2.7	81.141	0.000	***
– Total cultivated land area (ha)	31.2	5.4	6.3	6.7	7.8	123.691	0.000	***
Factor 3: Land fragmentation								
– Distance to biggest plot (km)	9.0	2.1	1.8	2.1	2.4	134.222	0.000	***
– Distance to most distant plot (km)	15.1	2.8	2.7	3.6	3.7	158.980	0.000	***
Factor 4: Subsistence reliance								
– Distance to nearest urban centre (km)	20.8	20.2	14.5	44.4	23.7	227.346	0.000	***
– Subsistence production contribution to total income (%)	15.8	18.2	16.2	40.5	22.6	142.688	0.000	***

*** Significant at the 1% level

Source: Sample of 1012 observations extracted from the SCARLED database

Tables 10 and 11 present the cluster validation variables and Table 12 describes the distribution of cluster membership by country and the share of total cultivated land area and value of production accounted for by each cluster. Table 13 details the intentions of households, by cluster, for the five year period following the time of the survey.[9] Table 14 reveals the objectives for agricultural production and perceived barriers.

Table 10. Continuous variables for cluster validation

	Large comm.	Part-time	Small comm.	Small subs.	Sample total	4-cluster F-value	Sig.	
N =	*68*	*283*	*418*	*243*	*1012*			
– Age of household head	51.7	47.9	57.7	56.7	54.3	39.762	0.000	***
– Education level of household head	3.0	3.5	2.9	3.3	3.2	33.712	0.000	***
– Total number of household members	3.8	3.5	3.5	3.3	3.5	2.464	0.061	*
– Equivalised household size	2.3	2.2	2.2	2.1	2.2	2.453	0.062	*
– Share of sales in output (%)	69.5	48.9	56.8	37.1	50.7	28.721	0.000	***
– Share of food consumption from own production (%)	41.1	39.9	43.0	53.3	44.5	12.574	0.000	***
– Value of agricultural equipment (PPP€)	54 687	10 848	16 393	8 212	15 691	27.865	0.000	***
– Total value of production (PPP€)	31 614	10 461	13 315	15 931	14 374	18.497	0.000	***
– Total value of sales (PPP€)	24 741	7 332	10 210	8 315	9 926	17.554	0.000	***
– Total value of subsistence production (PPP€)	6 873	3 129	3 105	7 616	4 448	17.917	0.000	***
– Total cash income (PPP€)	34 676	16 799	17 928	10 690	17 000	49.690	0.000	***
– Equivalised income per capita excl. subsistence production (PPP€)	15 375	8 008	8 255	5 114	7 910	45.691	0.000	***
– Equivalised income per capita incl. subsistence production (PPP€)	18 198	9 538	9 688	8 622	9 962	30.066	0.000	***

* Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level

Source: Sample of 1012 observations extracted from the SCARLED database

[9] The survey was carried out between late 2007 and early 2008.

Table 11. Binary variables for cluster validation, (share of cluster membership, %)

	Large commercial	Part-time farmers	Small commercial	Small subsistence	Sample total
N=	*68*	*283*	*418*	*243*	*1012*
– Below poverty line					
- Excluding subsistence production	2.9	9.5	13.9	27.2	15.1
- Including subsistence production	0.0	5.3	9.3	7.0	7.0
– Pushed above poverty line when including subsistence production	2.9	4.2	4.5	20.2	8.1
– Income diversification and labour for farming					
- At least one member self-employed	14.7	6.0	6.9	7.8	7.4
- At least one member in wage employment	61.8	69.6	63.4	46.1	60.9
– Farming with household labour only	70.6	89.4	87.6	77.4	84.5
– Use of credit and technical assistance					
- Formal credit for production and marketing used	13.2	6.7	5.0	12.8	7.9
- Technical assistance used	25.0	9.2	17.7	5.3	12.8
– Main farming technology					
- Own agricultural machinery	70.6%	38.9%	48.3%	30.0%	42.8%
- Other peoples' agricultural machinery	19.1%	36.4%	35.2%	35.4%	34.5%
- Own draft animals and agricultural machinery	1.5%	4.9%	2.2%	9.5%	4.6%
- Other peoples' draft animals and agricultural machinery	0.0%	2.8%	3.6%	2.9%	3.0%
- Manually	7.4%	15.9%	9.3%	21.0%	13.8%
– Orientation					
- Commercial	75.0	49.1	59.8	30.9	50.9
- Subsistence	25.0	50.9	40.2	69.1	49.1
– Self-assessment of level of income					
- Not enough for food and housing	4.4	20.8	13.4	29.2	18.7
- Enough for food and housing only	25.0	35.0	41.4	45.7	39.5
- Enough for food and housing and to cover some extra needs	54.4	34.3	38.0	21.0	34.0
- Sufficient to cover a wide range of needs and live comfortably	16.2	9.5	6.0	3.7	7.1
– Importance of contribution of own production to household welfare					
- Not important	25.0	21.9	19.1	6.6	17.3
- Very important	51.5	38.9	43.8	44.0	43.0
- Essential for survival	19.1	34.3	30.6	43.2	33.9

Source: Sample of 1012 observations extracted from the SCARLED database

Table 12. Cluster membership by country (%)* and contribution of total production

	Large commercial	Part-time farmers	Small commercial	Small subsistence	Country total
N =	*68*	*283*	*418*	*243*	
Country membership within clusters					
Bulgaria	5.6	21.5	8.9	64.0	100
Hungary	12.7	33.3	52.7	1.2	100
Poland	2.5	29.6	50.8	17.1	100
Romania	4.0	29.5	39.8	26.7	100
Slovenia	10.9	26.8	60.7	1.6	100
Cluster total:	*6.7*	*28.0*	*41.3*	*24.0*	*100*
Share of aggregated sample values					
Cultivated land area	14.5	21.9	40.0	23.5	100
Value of production (PPP€)	7.4	21.9	42.3	28.4	100
Value of agricultural equipment (PPP€)	19.8	19.5	45.3	15.4	100

* Bulgaria N = 214, Hungary N = 165, Poland N = 199, Romania N = 251, Slovenia N = 183, and sample total N = 1012.

Source: Sample of 1012 observations extracted from the SCARLED database

Table 13. Main 5-year objective for the household in relation to agriculture, by cluster (% of cluster total)

	Large commercial	Part-time farmers	Small commercial	Small subsistence	Sample average
N =	*68*	*283*	*418*	*243*	*1012*
No answer	1.5	2.5	4.3	3.8	3.4
No change	39.7	53.4	56.2	44.4	51.5
Objectives committing to farming					
To increase the share of sales	11.8	5.3	3.8	7.8	5.7
Intensify farming (increase labour/resource input)	14.7	9.5	7.2	15.2	10.3
Specialise farming	7.4	3.9	1.9	2.9	3.1
Category total:	*33.8*	*18.7*	*12.9*	*25.9*	*19.1*
Objectives to decrease farming					
To cease farming	1.5	6.4	6.5	8.2	6.5
To scale down farming	2.9	9.2	8.1	7.4	7.9
To retire	1.5	1.8	1.4	2.1	1.7
To transfer to the next generation	17.6	6.7	9.3	5.8	8.3
Decrease farming intensity (decrease labour/resource input)	1.5	1.4	1.2	2.5	1.6
Category total:	*25.0*	*25.4*	*26.6*	*25.9*	*26.0*

Source: Sample of 1012 observations extracted from the SCARLED database

Table 14. Objectives for Agricultural Production and Perceived Barriers by Cluster†

	Large comm.	Part-time	Small comm.	Small subs.	Sample Total	4-cluster F-value	Sig.	
N =	*68*	*283*	*418*	*243*	*1012*			
Objectives for agricultural production†								
– To provide food for the household	3.9	4.1	4.0	4.5	4.2	11.998	0.000	***
– To generate cash income	4.3	3.6	3.7	3.8	3.7	4.411	0.004	***
– To enjoy farming	3.9	3.4	3.6	3.4	3.5	3.771	0.010	***
– To transfer to the next generation	3.7	3.2	3.4	3.1	3.3	3.672	0.012	**
– To provide work for household members	3.4	2.9	3.2	3.4	3.2	5.329	0.001	***
Perceived barriers to increasing production and sales†								
– We receive low prices for agricultural output	4.1	4.2	4.2	4.1	4.2	0.686	0.561	
– We lack capital	3.6	3.7	3.8	3.9	3.7	1.238	0.295	
– Age/health prevent us from producing more than we currently do	2.6	2.9	3.1	3.1	3.0	3.104	0.026	**
– Market and transport infrastructure prevent us from selling our products	2.6	2.9	2.8	3.0	2.9	1.524	0.207	
– We lack information and advice on market prices	2.8	2.7	2.9	3.0	2.8	1.969	0.117	
– We cannot meet standards of buyers or public regulations	2.0	2.6	2.5	2.6	2.5	4.347	0.005	***
– We lack necessary skills and education	2.1	2.4	2.4	2.4	2.4	1.571	0.195	
– We get satisfactory income from current sales	2.8	2.1	2.2	2.1	2.2	7.651	0.000	***

† Likert-scale averages where 1 – Totally disagree; 2 – Somewhat disagree; 3 – Neither agree nor disagree; 4 – Somewhat agree; and 5 – Totally agree.
* Significant at 10% level; ** Significant at 5%-level; *** Significant at 1%-level

Source: Sample of 1012 observations extracted from the SCARLED database

5.2.1 Cluster 1: Large commercially oriented holdings

This cluster, labelled *large commercially oriented holdings,* enjoys by far the highest incomes in the sample (PPP€ 15,375 per capita excluding subsistence production), which is nearly twice the sample mean (Table 10). It is the smallest of the four clusters with only 68 households belonging to it (6.7 per cent of the sample), but accounts for 14.5 and 7.4 per cent of the whole sample's cultivated area and value of production. Income diversification is high, with relatively high shares of household members in both waged and self-employment (61.8 and 14.7 per cent, respectively) (Table 11). Reliance on only household labour for farming is significantly lower for this cluster. This is in line with theory suggesting that commercial farms operate for a profit employing hired labour whilst small family farms produce only for personal consumption using family labour (Chayanov, 1925), and that skilled household labour work off-farm while unskilled labour is hired in for on-farm work (e.g. Sadoulet *et al.*, 1998).

The commercial nature of these holdings is further reflected by their physical production assets. Cultivated land areas are large (on average 31 ha) and the value of machinery owned is nearly three and a half times the sample average. Moreover, the use of both technical assistance and credit for production and marketing is higher in comparison to other clusters, even though the vast majority of households eschew them. Land fragmentation is high, which is likely to be correlated with the magnitude of cultivated land areas. Meeting the standards of buyers and public regulations is significantly less of a problem for this cluster.

The main motivations for farming of this group are to generate cash incomes and to provide food for the household (Table 14). The high commitment to agriculture is further reflected by their future objectives (Table 13), where a third of households state an ambition to commit further to farming in the future. 17.6 per cent of household heads are looking to transfer to the next generation within the near future, but apart from that, only a small number is looking to decrease farming. Hence, this cluster is likely to persist in the future. With respect to increasing production and sales, households in this group are fairly unconstrained although they believe higher prices for agricultural output and to some degree, access to capital, could facilitate this (Table 14).

The contribution of subsistence production to incomes is relatively low (16 per cent). Although households source most of their food from outside their own farm, roughly 41 per cent of their food comes from their own farm, implying that its importance is not negligible (only 25 per cent believe that this contribution is not important for household welfare). Due to its small size, this cluster accounts for a minority of farms in every country studied (Table 12) but is larger in Hungary and Slovenia relative to the other countries.

5.2.2 Cluster 2: Part-time farmers

The second largest cluster consists of *part-time farmers* (n=283, 28 per cent of the sample). Household heads belonging to this group are the youngest in the sample

(47 years), and have the highest education levels. As farming is a part-time activity, it is no surprise that cultivated land areas are the smallest in the sample, and the total values for production, sales and subsistence production are consequently low. However, the part-time farmers' responses to attitudinal validation statements indicate that subsistence production has an ambiguous role for this group (Table 11). A higher than average share of households claim that current incomes are not enough to cover basic food and housing (20.8 per cent), and a high share of households judge subsistence production essential for survival (34.3 per cent) (Table 10). This indicates that subsistence farming constitutes an important component of a livelihood strategy for a large share of households in this cluster. At the same time, 9.5 per cent of households claim to have sufficient incomes to live comfortably and 21.9 per cent find that the contribution of own production to household welfare is not important. However, as a group, providing food for the household is the main motivator for farming while the agreement to farming in order to generate cash income is weaker (Table 14). This suggests that among the part-time farmers, there is a smaller share of households which may engage in farming as a hobby activity.

The orientation of households may be a further reflection of this picture. As a group, the part-time farmers are split between subsistence and commercial orientation and the average share of sales is roughly 50 per cent (Table 10). Moreover, the future objectives of this group with respect to farming may further reflect the different role of farming as part of a livelihood strategy (Table 13). A majority of households (53.4 per cent) do not envisage any changes in the short to medium term. However, 18.7 per cent of households intend to make further commitments to agriculture in the near future, in which they do not appear to face any major challenges (disagreement with perceived barriers listed in Table 14). The remainder are looking to decrease farming activity, notably by scaling down, by ceasing farming altogether or by a transfer to the next generation. The development of this cluster is likely to be linked to the characteristics of the off-farm labour market. Having good possibilities to work off farm is likely take some pressure off the need to farm the own land, and vice versa - difficulties to find work off-farm increases the reliance on subsistence production as part of a livelihood strategy.

Geographically this is the second largest cluster for all countries, being of highest importance in Hungary, followed by Poland and Romania (Table 12).

5.2.3 Cluster 3: Small commercially oriented households

The third and fourth clusters in the sample share common characteristics with respect to the profiling variables for income diversification, farm size and land fragmentation but differ substantially considering subsistence reliance. While the third and largest cluster (n=418, 41 per cent of the sample) mainly consists of *small commercially oriented households*, the fourth cluster (n=243, 24 per cent of the sample) is characterised by *small subsistence oriented households* in remote locations.

The *small commercially oriented households,* are located close to urban centres, yet are still mainly agricultural with respect to the allocation of time by the head of the household and sources of income. The average farm size is 6.3 ha, which is small by EU-15 standards. This cluster accounts for 40 per cent of the total sample's land area and 42.3 per cent of total production. Household labour predominates. Ownership of machinery is relatively high, meaning that these households are asset rich when compared against both part-time (Cluster 2) and subsistence oriented farmers (Cluster 4).

Households in this cluster have above average incomes, yet 13.9 per cent of households fall below the poverty line when excluding subsistence production. Despite providing food for the household is a slightly more pronounced reason for farming than generating cash income (Table 14), the value of subsistence production and its contribution to incomes are fairly low. Subsistence production only offsets poverty by 4.5 per cent and this cluster has the highest share of poor households after valuing subsistence production (9.3 per cent). Its contribution to income and food consumption are similar to the large and the part-time farmers in comparison to the relatively large scale farmers (Cluster 1), small commercial farmers do not employ credit to the same extent but the use of technical assistance is relatively high. With the household head averaging an age of nearly 58 years, it is not surprising that nearly one in ten are looking to transfer to the next generation within a five-year time frame. The same applies to ceasing and scaling down farming. Only a small proportion of households will take actions to intensify farming or increase the share of sales. The majority envisage continuing with current practices. Therefore, this cluster is likely to persist with only a small share of households disappearing from agriculture altogether. Given this is the largest cluster, accounting for the majority of farmers sampled in Slovenia, Hungary and Poland, small-scale, family farms are likely to remain an important feature of CEE agriculture, at least in the short to medium term (Table 12).

5.2.4 Cluster 4: Small subsistence oriented households

As discussed above, this cluster shares some key characteristics with the third cluster of small, commercially oriented households, regarding income diversification, farm size and land fragmentation. This fourth cluster stands out as being considerably more remotely located and has the highest dependence on subsistence production, hence their labelling as *small subsistence oriented households*.

The remote location of this group influences possibilities to find off-farm work. On average households in this cluster are 44.4 km from the nearest urban centre, compared to a sample mean of 23.7 km (Table 10). Income diversification of these households is very low in comparison to the large commercial (Cluster 1) and part-time farmers (Cluster 2), which are located closer to urban labour markets. Overall for the small subsistence oriented households in Cluster 4, 54 per cent of households do not have any household member engaged in off-farm wage

employment (Table 11). Subsequently cash incomes are low and involvement in agriculture and reliance on subsistence production high. The total value of production is higher than for the small commercial farmers (Cluster 3), but the share of sales is the lowest of all clusters (37.1 per cent). Meeting the standards of buyers and public regulations are a greater problem for this group. In further contrast to the other clusters, this group produces the majority of the food they consume.

The incidence of poverty is high: 27.2 per cent of households fall below the poverty line (prior to the evaluation of subsistence production) and a considerable number of households (29.2 per cent), claim incomes are not enough for food and housing. Subsistence production plays a particularly important role for household welfare and reduces the figure of households below the poverty line to 7.0 per cent, which is lower than for the small commercially oriented households. The importance of subsistence production for household welfare is evident from the attitudes of households: only 6.6 per cent households believe it to be unimportant, whereas the majority assess subsistence production to be either very important (44.0 per cent) or essential for survival (43.2 per cent) (Table 11). In line with this, this group expresses a strong agreement with farming to provide food for the household, and somewhat agree to generating cash income being an aim in farming (Table 14).

The less favourable economic situation of these households is reflected in the farming technologies applied and machinery ownership. The use of agricultural machinery is lower than for any other cluster. Yet commitment to agriculture remains high with 44 per cent envisaging no change in their farming operations and 25.9 per cent intending to intensify operations (increase sales or specialise within the near future). This may in part reflect the lack of alternative income possibilities in the most remote rural locations in the NMS, and all in all, this cluster is expected to persist as these farmers are likely to remain in agriculture in the future. However, receiving low prices for output, not getting satisfactory incomes from current sales and lack of capital, together with lack of necessary skills and education, are factors that might impede increased production and sales of these small subsistence farmers (Table 14).

Most of the households in this cluster are located in Bulgaria, and the cluster encompasses 64.0 per cent of Bulgarian households (Table 12). It is the third largest cluster for Romania (26.7 per cent) and Poland (17.1 per cent) but includes only a fraction of Hungarian and Slovenian households. The cluster accounts for 23.5 and 28.4 per cent of the total sample's cultivated area and production respectively, but only 15.4 per cent of agricultural assets.

6 CONCLUSIONS

The deliverable contributes to research on farming in the NMS by drawing on a recent and relatively large dataset of 1,012 observations which provides detailed information on agricultural households in contrasting rural regions of five countries (Bulgaria, Hungary, Poland, Romania and Slovenia). The research generates several key conclusions.

First, *subsistence production remains pervasive in the NMS*. Using Wharton's (1969) definition of subsistence farmers as those selling less than 50 per cent of their output, 49.1 per cent 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, *estimations of poverty are sensitive to the valuation of subsistence production*. Given the large number of subsistence oriented households in the NMS, this is an important finding. For the sample as a whole the valuation of subsistence production pushes 8 per cent of the sample above the poverty line (equivalent to roughly one half of those classified as poor prior to the valuation of such production). This research indicates that the impact of subsistence production for moving households above the poverty line is strongest in the poorest EU Member State, Bulgaria. However, the results should be treated with caution as this effect is sensitive to the distance of the poor households from the poverty line in the individual country samples. This explains why there are significant differences to the role of subsistence production in reducing relative poverty rates between the sampled countries.

Third, *the contribution of subsistence production to total incomes is uneven but significant*. Using the procedures outlined in Section 3, the equivalent value of subsistence food production is PPP€ 4,448 per household, accounting for, on average, 22.6 per cent of the total incomes of sampled households. Subsistence production contributes the most to rural household incomes in the poorest NMS in the sample: Romania and Bulgaria, and particularly for households below the poverty line. Only for households above the poverty line in Hungary and Slovenia does subsistence production contribute very little to total incomes.

Fourth, *subsistence production is most important for remote and poor households* (Cluster 4). 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 be closely linked to social security systems and whether the non-farm rural economy expands to provide alternative occupations in remote rural locations.

Fifth, in line with Kan *et al.'s* (2006) findings, *larger commercial farms (Cluster 1) are richer and better integrated* in markets. Smaller commercial farms (Cluster 3) are also better-off concerning farm incomes. However, the latter group is less integrated in labour and credit markets. They are run by older farmers and many plan to transfer the farms within a five-year period. Some of these farmers who do not have successors may sell out and exit. Yet, overall the vast majority of those sampled intend to remain within agriculture.

Finally, it is possible to assess the applicability of the theories of subsistence farming discussed in Section 2.2 in the light of the empirical findings. Few sampled households fit with western notions of hobby farming (Daniels, 1986); providing food for the household and generating cash incomes are both important aims for farming, including for part-time farmers (Table 14). The poorest households engage in farming as a survival strategy: 74.4 and 87.2 per cent of small commercial (Cluster 3) and small subsistence households (Cluster 4) respectively, rate own production as very important or essential for survival. The smaller, more subsistence oriented farms in Clusters 2 to 4 are significantly more likely to rate meeting the standards of buyers and public regulations as a problem to increased commercialisation, compared to the large commercially oriented holdings which are already well integrated with markets. This suggests that agricultural standards do act as a barrier to market participation in CEE which disproportionally affects small scale producers (Hernández *et al.*, 2007). Low prices received are perceived by all clusters as the most important barrier to increasing production and sales.

Overall, the analysis reveals the distinctiveness of farming in CEE compared against structures in Western Europe. Large commercial farms (Cluster) 1 have a mean farm size of 31.2 ha and agricultural equipment worth PPP€ 54,687. Such farms roughly equate to what would be considered a medium sized family farm in much of 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 CAP (Brookfield and Parsons, 2007). However, the large commercial holdings (Cluster 1) accounts for only 6.7, 14.5 and 7.4 per cent of sampled households, cultivated land area and of the value of production respectively. Most agricultural households studied, as well as land cultivated, do not fit with notions of what constitutes a typical family farm in Western Europe. While the small-sized farms (Clusters 2 to 4) account for the majority of those sampled, due to the relatively small size of their farms, such households are not the main beneficiaries of CAP direct payments (Davidova, 2008) which, for the most part, in the NMS are currently paid on a simple per hectare basis. The analysis reveals a stark mismatch between the fortunes of those who are mostly likely to benefit directly from the CAP (large commercial holdings) and those most in need (small commercially oriented and small subsistence oriented households). While a central objective of the CAP remains to ensure a 'fair standard of living for the agricultural community' (EC, 2009) current policy is unsuited for this task in the NMS.

LIST OF REFERENCES

Balint, B. & Wobst, P. (2006). Institutional Factors and Market Participation by Individual Farmers: The Case of Romania. *Post-Communist Economies,* 18**,** pp. 101-121.

Barnett, A., Blas, E. & Whiteside, A. (1996). AIDS Brief. Subsistence Agriculture. GPA/UNAIDS, 4-5.: WHO, Geneva.

Brookfield, H. & Parsons, H. (2007). *Family Farming, Survival and Prospect: A World-wide Analysis* Abingdon: Routledge.

Brüntrup, M. & Heidhues, F. (2002). Subsistence Agriculture in Development: Its Role in the Processes of Structural Change. *Discussion Paper.* University of Hohenheim.

Busch, L. (2000). The moral economy of grades and standards. *Journal of Rural Studies,* 16**,** pp. 273-283.

Chayanov, A. V. (1925). *Organizatsiya krest'yanskogo khozyaistva*, Moscow. Published in Russian and translated as "The Theory of Peasant Economy" in Thorner et al. (1966).

Daniels, T. (1986). Hobby farming in America: Rural development or threat to commercial agriculture? *Journal of Rural Studies,* 2**,** pp. 31-40.

Davidova, S. (2008). Implementation of Single Area Payment Scheme In The EU New Member States. *The 109th Seminar of the European Association of Agricultural Economists.* Viterbo, Italy, 20th-21st November.

Davidova, S., Fredriksson, L. & Bailey, A. (2009). Subsistence and semi-subsistence farming in selected EU new member states. *Agricultural Economics,* 40**,** pp. 733-744.

Dolan, C. & Humphrey, J. (2000). Governance and trade in fresh vegetables: the impact of UK supermarkets on the African horticulture industry. *Journal of Development Studies,* 37**,** pp. 147-176.

Dries, L., Reardon, T. & Swinnen, J. (2004). The rapid rise of supermarkets in Central and Eastern Europe: implications for the agrifood sector and rural development. *Development Policy Review,* 22**,** pp. 525-556.

EC (2009). *Mission statement: Directorate-General for Agriculture and Rural Development*, Commission for the European Communities, Brussels

Ellis, F. (1993). *Peasant Economics: Farm Households and Agrarian Development, 2nd edition*, Cambridge University Press.

Eurostat (2007a). Farm structure in Bulgaria - 2005. *Statistics in Focus.* Eurostat.

Eurostat (2007b). Farm structure in Romania - 2005. *Statistics in Focus.* Eurostat.

Eurostat (2008a). Farm structure in Poland - 2007. *Statistics in Focus.* Eurostat.

Eurostat (2008b). Farm structure in Slovenia - 2007. *Statistics in Focus.* Eurostat.

Eurostat (2009). Farm structure in Hungary - 2007. *Statistics in Focus.* Eurostat.

Eurostat FSS data (2007). Eurostat "Agriculture" database: http://epp.eurostat.ec.europa.eu/portal/page/portal/agriculture/data/database.

Evans, N. (2009). Adjustment strategies revisited: Agricultural change in the Welsh Marches. *Journal of Rural Studies,* 25(2)**,** pp. 217-230.

Fredriksson, L., Davidova, S. & Bailey, A. (2010). SCARLED Deliverable 6.6: Determinants for, and barriers to, exit from subsistence food production:

commonalities and differences among NMS. 6th Framework Programme SCARLED, Contract No. SSPE-CT-2006-0044201 (STREP).

Fritzsch, J., Wegener, S., Buchenrieder, G., Curtiss, J. & Gomez y Paloma, S. (2009). Semi-Subsistence Farm Households in Central and South-Eastern Europe: Current State and Future Perspectives. Contributed Paper presented at the International Association of Agricultural Economists Conference, Beijing, China, August 16-22, 2009.

Goetz, S. J. (1992). A Selectivity Model of Household Food Marketing Behavior in Sub-Saharan Africa. *American Journal of Agricultural Economics,* 74**,** pp. 444-452.

Gorton, M., Dumitrashko, M. & White, J. (2006). Overcoming supply chain failure in the agri-food sector: A case study from Moldova. *Food Policy,* 31**,** pp. 90-103.

Hair, J. F., Black, B., Babin, B., Anderson, R. E. & Tatham, R. L. (2006). *Multivariate data analysis*, Prentice hall.

Hatanaka, M., Bain, C. & Busch, L. (2005). Third-party certification in the global agrifood system. *Food Policy,* 30**,** pp. 354-369.

Hernández, R., Reardon, T. & Berdegué, J. (2007). Supermarkets, wholesalers, and tomato growers in Guatemala. *Agricultural Economics,* 36**,** pp. 281-290.

Holloway, L. (2002). Smallholding, hobby-farming, and commercial farming: ethical identities and the production of farming spaces. *Environment and Planning A,* 34**,** pp. 2055-2070.

Jaffee, S. & Henson, S. (2005). Agro-Food Exports from Developing Countries: The challenges posed by standards. *In:* AKSOY, M. & BEGHIN, J. (eds.) *Global agricultural trade and developing countries.* World Bank Publications.

Kan, I., Kimhi, A. & Lerman, Z. (2006). Farm Output, Non-Farm Income, and Commercialization in Rural Georgia. *eJADE (Electronic Journal of Agricultural and Development Economics) available online at www.fao.org/es/esa/eJADE,* 3**,** pp. 276-286.

Key, N., Sadoulet, E. & de Janvry, A. (2000). Transactions Costs and Agricultural Household Supply Response. *American Journal of Agricultural Economics,* 82**,** pp. 245-259.

Kostov, P. & Lingard, J. (2002). Subsistence farming in transitional economies: lessons from Bulgaria. *Journal of Rural Studies,* 18**,** pp. 83-94.

Kostov, P. & Lingard, J. (2004). Subsistence agriculture in transition economies: its roles and determinants. *Journal of Agricultural Economics,* 55**,** pp. 565-579.

Lerman, Z. (2001). Institutions and technologies for subsistence agriculture: how to improve commercialisation. Working Paper No.8.01. Department of Agricultural Economics and Management, The Hebrew University of Jerusalem.

Mathijs, E. & Noev, N. (2002). Commercialization and Subsistence in Transaction Agriculture: Empirical Evidence from Albania, Bulgaria, Hungary and Romania. *10th EAAE Congress "Exploring diversity in the European Agri-food System".* Zaragoza, Spain, August 28-31, 2002.

Mathijs, E. & Noev, N. (2004). Subsistence Farming in Central and Eastern Europe: Empirical Evidence from Albania, Bulgaria, Hungary, and Romania. *Eastern European Economics,* 42**,** pp. 72-89.

McConnell, D. & Dillon, J. (1997). Farm management for Asia: a systems approach. FAO Farm Systems Management Series 13, FAO, Rome, Italy.

Mellor, J. W. (1969). The subsistence farmer in traditional economies. *In:* WHARTON, C. R. (ed.) *Subsistence agriculture and economic development.* London: Frank Cass.

Milligan, G. W. (1996). Clustering validation: results and implications for applied analyses. . *In:* ARABIE, P., HUBERT, L. J. & DE SOETE, G. (eds.) *Clustering and Classification.* World Scientific, River Edge.

Munton, R. (1990). Farming families in upland Britain: options, strategies and futures. *Association of American Geographers, Toronto*.

Narrod, C., Roy, D., Okello, J., Avendaño, B., Rich, K. & Thorat, A. (2009). Public-private partnerships and collective action in high value fruit and vegetable supply chains. *Food Policy,* 34**,** pp. 8-15.

Petrovici, D. & Gorton, M. (2005). An evaluation of the importance of subsistence food production for assessments of poverty and policy targeting: Evidence from Romania. *Food Policy,* 30**,** pp. 205-223.

Punj, G. & Steward, D. W. (1983). Cluster analysis in marketing research: review and suggestions for research. *Journal of Marketing Research, Jg,* 20**,** 134-148.

Ravallion, M. (2008). On the Welfarist Rationale for Relative Poverty Lines. *The Oxford Handbook of Arguments for a Better World: Essays in Honor of Amartya Sen,* 1.

Reardon, T. (2006). The rapid rise of supermarkets and the use of private standards in their food product procurement systems in developing countries. *In:* RUBEN, R., SLINGERLAND, M. & NIJHOFF, H. (eds.) *Agro-food chains and networks for development.* Springer, Netherlands.

Runciman, W. (1966). *Relative deprivation and social justice: A study of attitudes to social inequality in twentieth-century England*, University of California Press.

Sadoulet, E., de Janvry, A. & Benjamin, C. (1998). Household Behavior with Imperfect Labor Markets. *Industrial Relations,* 37**,** pp. 85-108.

Sarris, A. H., Doucha, T. & Mathijs, E. (1999). Agricultural restructuring in central and eastern Europe: implications for competitiveness and rural development. *European Review of Agricultural Economics,* 26**,** pp. 305-329.

Shucksmith, M. & Herrmann, V. (2002). Future changes in British agriculture: projecting divergent farm household behaviour. *Journal of Agricultural Economics,* 53**,** 37-50.

Singh, I., Squire, L. & Strauss, J. (1986). *Agricultural household models: extensions, applications, and policy*, Baltimore: Johns Hopkins University Press.

Swinnen, J. (2005). When the market comes to you-or not. The Dynamics of Vertical Co-ordination in Agro-Food Chains in Europe and Central Asia. Washington: The World Bank.

Thorbecke, E. (1993). Impact of State and Civil Institutions on the Operation of Rural Market and Nonmarket Configurations. *World Development,* 21**,** pp. 591-605.

Tudor, M. & Balint, B. (2006). Off-farm Employment and Agricultural Sales: Evidence from Romania. *Post-Communist Economies,* 18**,** pp. 243-260.
Wharton, C. (1969). *Subsistence agriculture and economic development*, Aldine.
World Bank (2007). World Bank Report 2008: Agriculture for Development. The World Bank, Washington D.C.