# SEMI-SUBSISTENCE FARM HOUSEHOLDS IN CENTRAL AND

# SOUTH-EASTERN EUROPE: CURRENT STATE AND FUTURE PERSPECTIVES[1]

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**Abstract**

The European Union (EU) introduced a special transitional semi-subsistence measure to promote the smallest agricultural producers, so-called semi-subsistence farm households (SFHs) in the enlargement process. An outlook on the future of SFHs requires comprehensive and reliable information on the phenomenon and the impact of policy measures on their development. Therefore, a survey using a standardised questionnaire was conducted in Poland (175 households), Romania (185 households), and Bulgaria (184 households) from July to September 2007. In a first step, four major types of SFHs could be identified by means of cluster analysis: (i) rural diversifiers, (ii) rural pensioners, (iii) farmers, and (iv) rural newcomers. In a second step, a multiobjective linear programming household model was designed to simulate the impact of policy measures and various household strategies on the future viability of the SFHs. Results show that the most preferable combination of strategies for rural diversifiers and rural newcomers is starting a non-farm self-employed activity and developing their farms. Farmers will advance best when they focus on developing their farms only, whereas rural pensioners will mainly remain or become unviable.

# 1    Introduction

Farmers in Central and South-eastern Europe, especially semi-subsistence farm households (SFHs), have to make a series of decisions in order to increase their income. SFHs have persevered and, although often unprofitable from a farm business perspective, it is generally agreed that semi-subsistence farming is important in providing food and shelter for both, resident families and urban-based relatives in periods of structural changes, such as during the transition period (Heidhues and Brüntrup 2003, Braun and Lohlein 2003). There is an ongoing debate about what could prompt farm households in general and SFHs in specific to become more profitable or to exit farming (Chaplin et al. 2007, Hazell et al. 2007, Csaki et al. 2008). A number of policy measures within the Common Agricultural Policy (CAP) address this issue and, in the enlargement process of the European Union (EU), a special transitional semi-subsistence measure was introduced to promote development of the smallest agricultural producers into commercialised private farms (Council Regulation No. 1698/2005, Article 20(d)(i)). An outlook on the future of SFHs requires comprehensive and reliable information on the phenomenon of SFH and the impact of policy measures on their development. This contribution attempts to address both issues. It is organised as follows: Chapter 2 presents a literature review on semi-subsistence farm households and the current significance of semi-subsistence farming in Poland, Romania, and Bulgaria. Chapter 3 introduces the methodology applied to the subsequent cluster and impact analysis. Chapter 4 characterises the wide range of SFHs by describing different major types of households in the three survey countries. Chapter 5 focuses on their future perspectives and the impact of policy measures on their viability. The contribution ends with a summary of the main findings and conclusions.


# 2    Semi-subsistence: definitions and significance in Poland, Romania, and Bulgaria

Concepts of identification and clear definitions of SFHs are currently discussed throughout literature. Doppler (1992), Braun and Lohlein (2003), Heidhues and Brüntrup (2003), and McConnell and Dillon (1997) propose various indicators, but it is difficult to set a clear-cut borderline with respect to subsistence farms on the one side and commercial ones on the other.

Due to their importance and the political will that SFHs should be supported in order to expand and improve agricultural production, the EU and national governments were faced with the challenge to come to terms with SFHs. According to the EU, semi-subsistence farms are defined as "agricultural holdings which produce primarily for their own consumption and also market a portion of their output" (EC Regulation 1698/2005, Article 34(1)). However, there is no percentage threshold given with respect to the share of farm sales to distinguish between subsistence and commercial farms. With the EU-definition as a basis, the countries under review have adopted a rather pragmatic definition of SFHs at the national levels. In Poland, the agricultural production value has to be within the range of 2 to 4 European Size

Units (ESU) (MARDP 2007) (1 ESU=1,200 EUR standard gross margin), it is wider in Bulgaria where all farms producing between 1 to 4 ESU (MASF 2007) are classified as SFHs. The broadest limits have been set in Romania where the production value of the farms has to be within 2 to 8 ESU (MARDR 2008). Following the national thresholds, a SFH is defined in this contribution as an agricultural holding of size 1 to 4 ESU that markets part of its agricultural production. Farms smaller than 1 ESU are considered to be subsistent, whereas farms larger than 4 ESU are seen as commercialised farms.

**Figure 1:** **Percentages of number of agricultural holdings and utilised agricultural area (UAA) in farm size categories (ESU)**
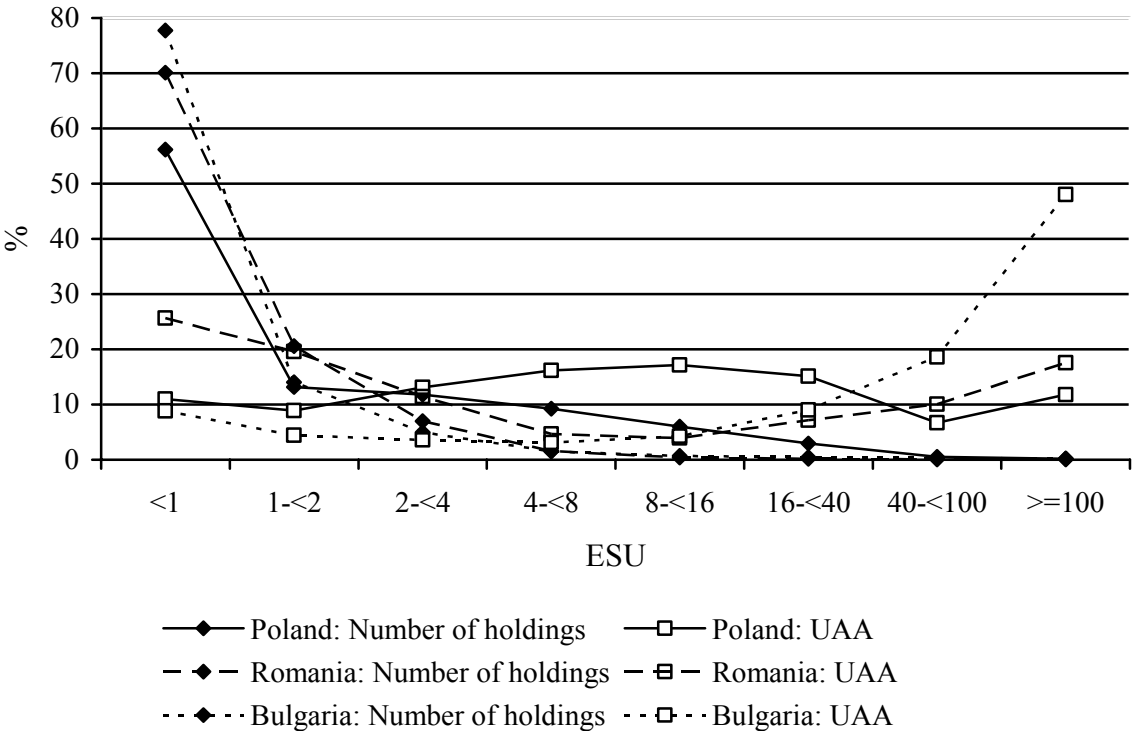


Source: Own calculation with data from Eurostat (2008).

The agricultural semi-subsistence sector is equally important in Poland, Romania, and Bulgaria. Figure 1 shows the percentage of agricultural holdings in various farm size categories and their respective utilised agricultural area (UAA). SFHs, e.g. farms of size 1 to 4 ESU, make up about one quarter of farms in Poland (25.0%) and Romania (27.6%). They are less important in Bulgaria with fewer than one fifth of farms (19.0%). Together, about 1.9 million farms can be classified as semi-subsistent in the three countries. The semi-subsistence farm households in Poland and Romania use a share of UAA which approximately corresponds to their share in the number of holdings, 22% of UAA in Poland and 31% in Romania. In Bulgaria, a discrepancy between the share of holdings and the share of UAA is observed because Bulgarian SFHs operate only 8% of UAA (Eurostat 2008).

# 3 Methodological approach for cluster and policy analysis of SFHs

Statistical information on SFHs is sparse. Therefore, surveys in Poland, Romania, and Bulgaria to establish a cross-country database on SFHs were conducted. To this end, 544 SFHs, 175 in Poland, 184 in Romania, and 185 in Bulgaria, were interviewed from July to September 2007 using a standardised questionnaire.

Semi-subsistence farm households are not a homogeneous group and appear under various forms which have to be accounted for by distinguishing between several major types of SFHs. The methodology of first choice for identifying homogeneous groups of households - the major types of SFHs - is cluster analysis. In the first step, Ward's method was applied to get a rough overview and calculate the arithmetic means of all standardised cluster variables. These arithmetic means were used in the second step to improve the allocation of SFHs to the various clusters by the k-means procedure. This two-stage procedure, i.e. the combination of a hierarchical cluster method like Ward's method with k-means was successfully applied to rural households by Chaplin et al. (2007), Jansen et al. (2006), and Petrocivi and Gorton (2005).

Figure 2 shows the 13 variables used to identify the major types of SFHs. All variables were standardised. For the calculation, the countries' datasets were pooled. Outliers were excluded from analysis. The total sample without 55 outliers counts 489 observations: 158 Polish SFHs, 153 Romanian, and 178 Bulgarian SFHs.

For policy analysis a multiobjective linear programming (MOLP) household model was implemented in GAMS using compromise programming (Romero and Rehman 2003). Programming models describe a problem concisely in mathematical terms, involve relevant cause-and-effect relationships, and consider them simultaneously. However, like all models, they are a simplified representation of reality and a good balance between manageability and complexity of the model has to be found. Programming models typically optimise only one objective function. However, according to Braun and Lohlein (2003), modelling the transition process from subsistence to market-oriented production has to take into account multiple objectives, for instance risk aversion, preferences for special activities, and motivations that may cause an SFH to keep a certain degree of self-sufficiency even at the cost of income losses. Programming models were successfully applied to rural households, e.g. by Teufel (2007), Bezuneh et al. (1988), and Maatmann et al. (2002). Therefore, a MOLP model is used which explicitly considers the four relevant objectives for SFHs:

1. Net agricultural production (maximised),
2. Net non-farm income (maximised),
3. Household's cash balance (maximised), and
4. Agricultural labour use (minimised).

The weights of the single objectives were empirically assessed. In addition, aims of households were considered setting lower bounds. If the households expressed high values for farming related aims like "enjoy rural lifestyle", a lower bound was set for the farming activity. Lower bounds were also set for waged employment if the household mentioned that

diversifying income sources is an important aim. Further constraints are the available labour and land.

The implemented farm household model considers three income activities as decision variables (farming, self-employment, and waged employment) with their operational costs and labour inputs. The labour input can be satisfied for farming and self-employed activities by family and hired labour.

The simulation was carried out for one real household per major type of SFH and country, in total twelve households, using data from the household survey. The selected households had to represent their respective major types, i.e. the household's values of the variables used in cluster analysis had to be comparable to the median value of the respective major type. Costs and income parameters were increased by the growth forecasts of gross domestic product (GDP) (FAPRI 2008) to calculate the parameters of the simulation year 2016 (51% Poland, 59% Romania, 54% Bulgaria). For agricultural income, the simulated increase of 150% was even higher considering the rapid increase of agricultural product prices from 2006 to 2007. Furthermore, based on expert assessments, costs for education, transport, and energy were increased by 80%, and costs for farming were increased by 110%, as it can be assumed that these costs will rise above the GDP growth level.

**Table 1:    Scenarios for policy analysis**

| Scenarios | Policy measures | | | | |
|---|---|---|---|---|---|
| | SAPS [*] | Semi-subsistence support | Farm investment | Diversification support | Early retirement |
| Baseline (**base**) | x | | | | |
| Farm development with semi-subsistence support (**farm+sss**) | x | x | x | | |
| Farm development without semi-subsistence support (**farm**) | x | | x | | |
| Start self-employment with semi-subsistence support (**self+sss**) | x | x | | x | |
| Start self-employment without semi-subsistence support (**self**) | x | | | x | |
| Farm development and start self employment with semi-subsistence support (**farm+self+sss**) | x | x | x | x | |
| Farm development and start self employment without semi-subsistence support (**farm+self**) | x | | x | x | |
| Stop agriculture (**retire**) | | | | | x |

Note:    [*] SAPS: single area payment scheme.

The impact of policy measures was assessed by calculating scenarios (Table 1) with different strategies, for which the households receive respective support from policy measures. By comparing the household's cash balance of the baseline scenario with the results of the four policy measures, with and without transitional semi-subsistence payment, their impact on the development of the SFH's from each major type is assessed.

## 4      Major types of semi-subsistence farm households

The cluster analysis identified four clearly separated major types of SFHs. The web diagram (Figure 2) shows the cluster centres for the thirteen standardised variables for all four major types of SFHs. It can be seen that the major types are distinguished in certain characteristics that determine their names as:

**1.   Rural non-farm oriented households (Rural diversifiers, N=150):**

Rural diversifiers are characterised by the highest share of non-farm net income in household net income and the highest level of formal schooling that may well be a precondition for the non-farm employment. The households have the highest share of own used agricultural production in total agricultural production. This corresponds well with the highest number of agricultural products as compared to other SFH types because subsistent households must produce a wide range of products to meet family demand. They also have a low share of social security benefits in net household income.

**2.   Rural pensioners and deprived households (Rural pensioners, N=83):**

The rural pensioners' households are characterised by the highest age of farm operators and the highest dependency ratio. The farm operators have many years of experiences in managing a farm but they have also the lowest level of agricultural qualification and they operate the smallest farms. On the one hand, they have the highest share of social security benefits in household net income and on the other hand, the share of non-farm net income is the lowest.

**3.   Large-scale semi-subsistence farm households (Farmers, N=153):**

Farmers operate the largest farms. They produce relatively more crop products than animal products and they are better integrated into the agricultural product market than other types of SFHs. It is also worth mentioning that farmers' households had the highest annual cash balance in 2006.

**4.   Rural households with undeveloped potential (Rural newcomers, N=103):**

All together, it is not possible to say much that is positive about rural newcomers from the web diagram (Figure 2). The SFH owners of this type are the youngest and have very little experience in farm management. It must also be mentioned that they had the lowest annual household cash balance in 2006 and that their level of formal schooling is very low. There seems to be a lot of potential for future improvement of their socio-economic situation.

**Figure 2:      Web diagram for major types of SFHs**
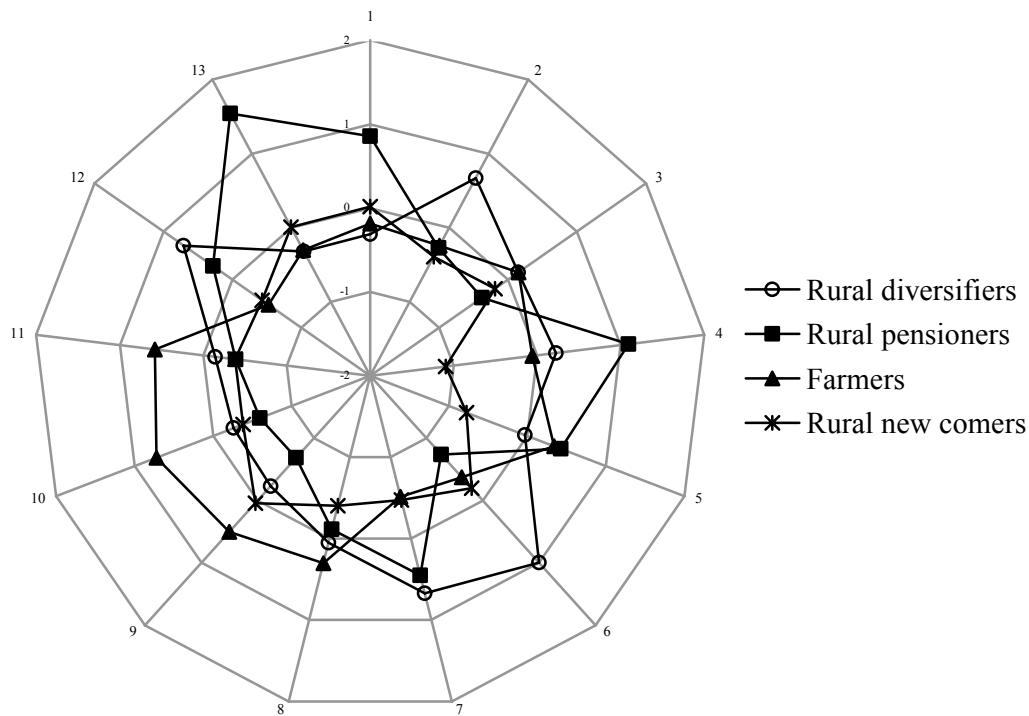


Notes:   Names of axes: 1: dependency ratio; 2: highest formal schooling in the household; 3: agricultural qualification of farm operator; 4: age of farm operator; 5: farm operator's experience as farm manager; 6: share of non-farm net income in household net income; 7: share of own used agricultural production in total agricultural production; 8: household's cash balance; 9: economic farm size; 10: cultivated agricultural area (ha); 11: share of crop production in total agricultural production; 12: number of agricultural products; 13: share of social security benefits in household net income.

Source:   Own calculations with data from project survey.

# 5      Future perspectives of SFHs

The policy simulations were carried out for one real existing household from each major type and each country using the MOLP model. The effect of the transitional semi-subsistence measure on the household's cash balances could be shown in 36 simulations with and without the transitional semi-subsistence payment, i.e. twelve households with diversification scenario, farm development scenario, and farm development plus diversification scenario.

In the scenarios that imply farm development, the effect of the measure was exactly the 100 EUR which were presumed in the model as the net return of investing the received money into the farm. Differing results were only obtained in the diversification scenarios. Table 2 shows the effect on the households' cash balances for the twelve households. For all farmers and Bulgarian rural diversifiers the effect is 100 EUR, thus the assumed net profit of the measure re-emerges in the cash balance. However, for Polish rural diversifiers, rural pensioners, and rural newcomers the effect was bigger than the assumed net return of 100 EUR. For Romanian rural diversifiers it was less than 100 EUR, but still positive. For Romanian and Bulgarian rural pensioners and rural newcomers the households' cash balance would reduce if the households were trying to diversify their income sources and at the same

time to develop their farm under the transitional semi-subsistence measure. The reason for these differing results is a shift of labour of these households to non-farm activities in diversification scenarios without the semi-subsistence measure, as in these scenarios there is no condition to maintain the current level of farming. Households with an increase in cash balances greater than 100 EUR in diversification scenarios with the semi-subsistence measure have a high preference for non-farm activities, despite a lower income than from the farming activity. In those cases the households are distracted from non-farm activities when participating in the measure and are kept in farming, which on the other hand results in higher cash balances. However, looking at the cash balance alone does not consider possible rational reasons for the specific preferences of these households, such as a more secure and stable income from a waged job employment.

Households with changes in cash balances lower than 100 EUR have a higher income from non-farm activities. If they opted for the semi-subsistence measure they would be kept in the farming activity, which is less profitable for them than non-farm activities.

**Table 2:** **Effect of the transitional semi-subsistence measure on household cash balance in diversification scenarios (net EUR)**

|  | Rural diversifiers | Rural pensioners | Farmers | Rural newcomers |
|---|---|---|---|---|
| Poland | 740 | 504 | 100 | 972 |
| Romania | 43 | **-192** | 100 | **-436** |
| Bulgaria | 100 | **-910** | 100 | **-86** |

Note: Differences in the household's cash balances in diversification scenarios with the transitional semi-subsistence measure (self+sss) as compared to diversification scenarios without the payment (self). Negative values indicate that the household's cash balance would be higher without transitional semi-subsistence support than with the measure.
Source: Own simulation results with data from project survey.

In addition, policy simulations (Table 3) show the impact of different strategies with respective policy measures on the household cash balances for each major type.

The best combination of strategies for rural diversifiers is to start a non-farm self-employed activity and farm development, while "continuing as it is" and to "stop agriculture" would worsen the households' cash balances. Polish rural diversifiers are an exception; for them, early retirement is most preferable, whereas starting a self-employed activity outside agriculture is the only strategy that would result in a negative cash balance. Rural pensioners will mainly remain or, in the Romanian case, become non-viable. Exceptions are found for Bulgarian households that will become viable when embarking on early retirement or on self-employment. The Polish households will have a positive cash balance when they develop their farms. Simulation results show that the major type termed farmers will advance best under the farm development scenario. Alternatively, "continuing as it is" is also a feasible option, whereas the least preferable option is early retirement. For rural newcomers, starting a non-farm self-employed activity and farm development are favourable strategies while "continuing as it is" and early retirement can generally not be recommended. Exceptions are Polish rural newcomers because they would fare better under the early retirement scheme than

their Romanian and Bulgarian counterparts, whereas starting self-employment would result in the most negative households' cash balance out of the four strategies.

Simulation results are influenced by the assumed growth indices for simulation parameters like costs and income. Since future economic development might differ from these assumptions, sensitivity analyses were carried out for the Polish rural newcomers' household. The focus was on the parameter "operational costs per unit of activity" that was altered as described in the following:

- 15% and 30% increase in operational costs per unit farming and
- 10% increase and decrease in operational costs per unit self-employment and waged employment.

Results show no alterations in the activity levels in all sensitivity analyses. However, there were impacts on net agricultural production and net non-farm income. This results in lower cash balances but does not change the excellence of the strategies with one exception: when the operational costs per unit farming are increased by 30%, early retirement results in a higher cash balance than farm development. This was not the case before. In addition, the increased operational costs per unit farming decreased the value of net agricultural production. But this decrease was no more than 12%. The effect of decreased or increased operational costs per unit non-farm income activities is straightforward. When the operational costs are increased the net income from non-farm income activities decreases marginal by no more than 5% and vice versa.

**Table 3:    Results of policy simulation**

| Comparison of household's cash balance in 2006 with base scenario in 2016 | | | | |
| --- | --- | --- | --- | --- |
| | Rural diversifiers | Rural pensioners | Farmers | Rural newcomers |
| *Poland* | | | | |
| 2006 | + | - | - | - |
| 2016 base | ++ | -- | ++ | -+ |
| *Romania* | | | | |
| 2006 | - | + | - | - |
| 2016 base | -+ | -- | -- | -- |
| *Bulgaria* | | | | |
| 2006 | - | - | + | + |
| 2016 base | ++ | -- | ++ | ++ |
| **Comparison of household's cash balance in base scenario with early retirement scenario** | | | | |
| | Rural diversifiers | Rural pensioners | Farmers | Rural newcomers |
| *Poland* | | | | |
| base | + | - | + | - |
| retire | ++ | -- | +- | ++ |
| *Romania* | | | | |
| base | - | - | - | - |
| retire | -- | -- | -- | -- |
| *Bulgaria* | | | | |
| base | + | - | + | + |
| retire | -- | ++ | -- | -- |
| **Comparison of household's cash balance in base scenario with diversification scenario without transitional semi-subsistence payment** | | | | |
| | Rural diversifiers | Rural pensioners | Farmers | Rural newcomers |
| *Poland* | | | | |
| base | + | - | + | - |
| self | -- | -- | +- | -- |
| *Romania* | | | | |
| base | - | - | - | - |
| self | ++ | -+ | -- | -+ |
| *Bulgaria* | | | | |
| base | + | - | + | + |
| self | ++ | ++ | ++ | ++ |
| **Comparison of household's cash balance in base scenario with farm investment scenario without transitional semi-subsistence payment** | | | | |
| | Rural diversifiers | Rural pensioners | Farmers | Rural newcomers |
| *Poland* | | | | |
| base | + | - | + | - |
| farm | ++ | ++ | ++ | ++ |
| *Romania* | | | | |
| base | - | - | - | - |
| farm | -+ | -+ | -+ | -- |
| *Bulgaria* | | | | |
| base | + | - | + | + |
| farm | ++ | -+ | ++ | ++ |

Notes:  +: Household's cash balance is positive in 2006/in base. -: Household's cash balance is negative in 2006/in base. ++: Household's cash balance is positive in 2016 base and increased in comparison to 2006/is positive in retire/self/farm and increased in comparison to base. +-: Household's cash balance is positive in 2016 base but decreased in comparison to 2006/is positive in retire/self/farm but decreased in comparison to base. -+: Household's cash balance is negative in 2016 base but increased in comparison to 2006/is negative in retire/self/farm but increased in comparison to base. --: Household's cash balance is negative in 2016 base and decreased in comparison to 2006/is negative in retire/self/farm and decreased in comparison to base.

Source: Own simulation results with data from project survey.

# 6 Conclusion

Semi-subsistent farm households do not form a homogeneous group. Data from a farm household survey in Poland, Romania, and Bulgaria show that some of them receive a sizeable income from waged jobs or self-employed activities but most of them are constraint in their physical size and financial capital, especially the households headed by younger persons suffer from lacking human capital in form of adequate education and skills. Consequently, the short-term perspectives for many households seem quite limited and, it is more likely than not, that they will simply wait for what the future will bring and meanwhile act to satisfy their daily needs.

Results from a multiobjective linear programming model show that policy can foster the structural change in the agricultural semi-subsistence sector by various support measures. Yet, fine targeting for the various types of semi-subsistence is a strong precondition for success. Rural diversifiers are not doing extremely well, but they earn sufficient income from waged employment and farming to support their livelihoods. Given that they are on average relatively well educated, it is reasonable to assume that this major SFH type can maintain its status quo until retirement, particularly since retirement is near for the majority. The recommendation would be to leave them alone but prepare the ground for them to enjoy a poverty-free retirement. Rural pensioners were found to be non-viable under most policy scenarios. Given their high average ages, a well- functioning and generous social security system seems to be most beneficial for them. As they display mostly a negative cash balance, the pensions would not only have to be adapted to economic growth in terms of average percentage growth but more generously to remedy their grave situation. SFHs classified as farmers possess the biggest development potentials. Even now, without additional policy measures these households are mostly in a comparably good situation. Nevertheless, the farm investment measure could help them grow and prosper further. Yet, the average age of farm owners is quite high. Thus, for this type of farm the question of how to make the farm attractive to a potential successor and the implementation of an effective pension programme are also important issues to be addressed. Overall, this type of SFHs can greatly benefit from sectoral policy measures. Similarly to the group of farmers, rural newcomers should be at the focus of policy measures because they are relatively young and lack professional training with regard to farming activities, but also in the non-farm sector their employability is rather limited. If they continue as they do at present, their socio-economic situation will further deteriorate. It would be in their best interest, on the one hand, to improve their employability in the non-farm labour market. On the other hand, in order to become capable of operating a farm economically successfully, they need advice on investment and production strategies as well as on marketing concepts.

## Acknowledgment

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