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# Moldovan family farms: social buffer or economic driver?
## A survey-based assessment

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# Summary

## Abstract and Keywords

*After obtaining independence from the USSR in 1991, the Republic of Moldova carried out an insider, equity-driven privatization of the land belonging to former Soviet collective farms. As a result, almost 900,000 small family farms emerged, the majority of whom are still active today. Although they play an important socio-economic role, policy makers neglect them as a residual, shrinking phenomenon. By adopting the theoretical perspective of peasant economics, this dissertation aims at assessing the health status of these farms over ten years after the land reform and their evolution over time. Data from an original mixed quantitative and qualitative survey carried out on a sample of 126 farms in spring 2015, and the databases of the Household Budget Survey for the period 2006-2013 are used. The main drivers of farmers' livelihood choices are identified by means of a 31-item Likert scale, and a comprehensive picture of the typical family farm is drawn. Farms are then grouped according to land size, level of commercialization and location, and their evolution over time is analysed by means of Markov transition chains and multinomial logistic regressions. A focus on production strategies follows. Finally, the impact of agriculture on poverty levels and the implications of alternative livelihood choices are assessed by means of counterfactual incomes and life levels calculated through propensity score matching. It emerges that families were allocated land plots without the tools for working them. Therefore, they adopt low-input, labour-intensive production strategies and are mainly subsistence-oriented. Farm income, although small, plays a key role in relieving vulnerable people from poverty, so that land is a fundamental social buffer. Moreover, home food production is important for social and self-appraisal. For these reasons, an agricultural development strategy based on farm intensification rather than growth and on leasing rather than sale of land is proposed.*

**Keywords:** family farming, peasant economics, Republic of Moldova, post-communist transition, land reform, farmer motivation, subsistence, poverty reduction, household, Household Budget Survey.

*Dopo l'indipendenza dall'URSS (1991), la Moldavia ha privatizzato le terre delle fattorie collettive distribuendo voucher ai lavoratori. Questo processo ha generato circa 900.000 piccole aziende familiari, in maggioranza ancora attive. Benché rivestano un'importante funzione socio-economica, queste sono trattate dalle istituzioni come un fenomeno residuale e in via di esaurimento. Adottando il punto di vista della* peasant economy, *questa tesi si ripropone di valutarne lo stato di salute a distanza di oltre dieci anni dalla riforma agraria. A tal fine, vengono utilizzati i dati raccolti dall'autore attraverso un'indagine realizzata nella primavera 2015 su un campione di 126 famiglie e le banche dati dell'Indagine sui Redditi delle Famiglie per il 2006-2013. In primo luogo, si identificano le motivazioni degli agricoltori e viene presentata una descrizione densa della tipica famiglia contadina. Successivamente, queste sono raggruppate secondo la terra posseduta, il livello di commercializzazione e la posizione geografica, e la loro evoluzione è analizzata usando matrici di transizione di Markov ed equazioni logistiche multinomiali. Segue un focus sulle strategie di produzione. Infine, l'impatto dell'agricoltura sulla povertà e le implicazioni di diverse strategie di sopravvivenza sono analizzati attraverso i redditi teorici calcolati con il* propensity score matching. *Emerge che le famiglie hanno ricevuto la terra ma non i mezzi per lavorarla, per cui sono costrette ad adottare tecniche di produzione ad alta intensità di lavoro e bassa intensità di capitale, e producono quasi esclusivamente per l'autoconsumo. Il reddito agricolo aiuta le famiglie vulnerabili a combattere la povertà, per cui la terra rappresenta uno strumento di* welfare. *Inoltre, la capacità di produrre cibo e la proprietà terriera sono motivo di autorealizzazione e generano considerazione sociale. Per questi motivi, si suggerisce una strategia di sviluppo agricolo che punti sull'intensificazione della produzione piuttosto che sulla concentrazione della proprietà e che agevoli l'affitto delle terre piuttosto che la loro vendita.*

**Parole chiave**: agricoltura familiare, *peasant economics*, Moldavia, transizione postcomunista, riforma agraria, motivazione dei contadini, sussistenza, riduzione della povertà, famiglia, Indagine sui Redditi delle Famiglie.

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# Glossary of Abbreviations

| | |
|---|---|
| AA | Association Agreement |
| ACSA | National Agency for Rural Development |
| AIPA | Agency for Interventions and Payments in Agriculture |
| ATU | Autonomous Territorial Unit |
| CIS | Community of Independent States |
| DCFTA | Deep and Comprehensive Free Trade Agreement |
| EBRD | European Bank for Reconstruction and Development |
| ENPARD | European Neighbourhood Program for Agriculture and Rural Development |
| EU | European Union |
| EUR | Euro [the official currency of the Eurozone] |
| FAO | Food and Agricultural Organization of the United Nations |
| GDP | Gross Domestic Product |
| HBS | Household Budget Survey of the National Bureau of Statistics of the Republic of Moldova |
| IFAD | International Fund for Agricultural Development of the United Nations |
| JICA | Japan International Cooperation Agency |
| MAFI | Ministry of Agriculture and Food Industry of the Republic of Moldova |
| MDL | Moldovan *Leu* (plural: *Lei*) [the official currency of the Republic of Moldova] |
| NBS | National Bureau of Statistics of the Republic of Moldova |
| NLP | National Land Program |
| OLS | Ordinary Least Squares |
| PDAM | Agrarian Democratic Party of Moldova |
| PPP | Purchasing Power Parity |
| PSM | Propensity Score Matching |
| PSU | Primary Sampling Unit |
| SGP | System of Generalized Preferences |
| SGP+ | Enhanced System of Generalized Preferences |
| SPSS | Statistical Package for Social Science |
| SSR | Soviet Socialist Republic |
| SWOT | Strengths, Weaknesses, Threats and Opportunities analysis |
| USA/US | United States of America |
| USD | United States Dollar [the official currency of the United States of America] |
| USSR | Union of Soviet Socialist Republics |
| WWII | Second World War |

# Acknowledgments

Completing this dissertation has been a tough task, first of all because it focuses on a region which has been losing attractiveness among scholars in the last decade. I got interested in the Republic of Moldova during my MA in Cooperation, Development and Human Rights, and I decided to analyse the political development of this country in my Master thesis. This work was awarded the right of publication and was indeed published in 2012 with the title «Post-Soviet Moldova». When carrying out that research, I developed the awareness that scholars had been focusing too much on interethnic relations and foreign policy, while the basic issue of the distribution of resources (first of all land) among the Moldovan population was mostly neglected. Since the agricultural sector is the base of the development of traditional societies, and it needs to be studied with rigorous tools that I was lacking, I decided to apply for a PhD scholarship at the Department of Statistics, where a curriculum in Agro-food Economics and Statistics was available. My first thanks go, thus, to the members of the commission, who considered my topic worth being investigated. I extend this gratitude to the Italian Ministry of Education, which – unluckily less and less – allows young scholars to conduct independent research through its resources. Indeed, independent research means being free to set the main question and the goals, not only the methods to investigate a topic. Since I was so lucky to be given this opportunity – I think that being born in a developed country, in a family that appreciates culture, is a question of good fortune, rather than of merit –, I want to use it for granting visibility to people who did not have the same luck. Among them are Moldovan rural dwellers. I am firmly convinced that the agricultural sector of this country deserves being investigated regardless of availability of funding or data, even at the cost of recovering the latter autonomously, which I did, strengthening the value of my research.

My second thanks go, obviously, to my wife Svetlana, who supported me alongside the doctorate, and especially during the preparation of the thesis, by translating or correcting my Romanian texts, helping me processing survey data, reading and correcting the drafts. When you will read that the survey was carried out by a team of two people, this is us: she was reading the questionnaire, and I was filling the form. Without her help, this thesis would not exist.

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# 1. Preliminary Framework

The Republic of Moldova within its present borders was created in 1940 by the USSR, by merging the historical regions of Transnistria and Bessarabia. This area lacks mineral resources and its distance from the main trade routes of the European continent prevented the creation of important commercial cities. However, its mild climate in comparison with the rest of the USSR, and its fertile black soil (*chernozem*) favoured the development of a luxuriant agriculture, which made the Moldovan SSR an important provider of farm products for the whole USSR. For this reason, one of the first acts of the new government after independence was the approval of the Land code, which provided for extensive privatization of the land belonging to the existing Soviet collective farms. The secession of Transnistria, where all national industries (apart from food processing ones and a few more) are located, increased the role of agriculture within the economy even further. Although it took more than one decade for distributing land shares to the population, at the beginning of 2015, 74.0% of the agricultural land was in private hands – a figure that reaches 85.8% if excluding pastures and hayfields, and peaks 94.2% for vineyards.

Today, with a GDP per capita of 4,982.60 current international dollars (PPP), Moldova is the poorest European country. It is also the only one, together with Slovenia and the disputed territory of Kosovo, where a majority of the population lives in rural areas: 50.2% according to FAO, 65.8% based on provisional data from the 2014 Population Census. Hence, agricultural employment is very high: 26.0% in 2013 according to the World Bank. However, this figure is amply underestimated: the 2011 Agricultural Census detected 1.6 million people who had worked in their family farms in the agricultural year 2010 (corresponding to 1.29 times the national work force), and 375,370 wage workers for an average of 34 working days each. Indeed, the equity-driven privatization process – largely welcomed and shaped by international aid agencies – created a large class of smallholders: the 2011 Census concerned almost 900,000 agricultural units without juridical status only in rural areas, on a population of just 3.5 million inhabitants. Most of these farms have a small land size, and produce for self-consumption, eventually selling their surplus on local markets or to neighbours; on the other side, less than 3,500 corporate farms use 56.7% of the total farmland and produce for export, so that the Moldovan agricultural sector has a clear dualistic structure (Lerman *et al.* 1998).

The reforms implemented after independence focused mainly on land redistribution, ignoring the role of former collective farms as service providers in rural areas (Gorton and White 2003). Therefore, especially during the harsh years of transition, small farms became an important substitute of the welfare State. This role is still important in a country where a large share of urban dwellers is made of first-generation migrants, who keep strong ties with their relatives living in rural areas. However, farming is not able to provide a decent income to the population; therefore, due to the lack of employment opportunities in other sectors, a large number of citizens left the country in order to support their families with remittances. In 2014, Moldova was the third country in the world by share of remittances on the GDP after two other post-Soviet States (Tajikistan and Kyrgyzstan), with 26.1%[1].

Smallholder farming, that represented the core claim of pro-independence forces at the end of the 1980s, shaped the lifestyle of Moldovan citizens in the following decades, but was not able to boost economic development in the country, and is now neglected by the government and by international aid agencies as a residual, shrinking sector. However, the revived interest for post-Soviet countries after the Ukrainian crisis, and the new dynamism shown by both West and East – which took the form of the EU Neighbourhood Policy's Eastern Partnership and the Eurasian Economic Union respectively – demonstrate that Moldova has some opportunities for improving its economic situation. In June 2014, Chişinău signed an Association Agreement (AA) and a Deep and Comprehensive Free Trade Agreement (DCFTA) with Brussels, which will have important implications for the internal agricultural sector.

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[1] [1] World Bank, http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD [Accessed: 10th November 2015]; FAOSTAT, http://faostat.fao.org/site/452/default.aspx [Accessed: 10th November 2015].

Given the aforementioned features of Moldovan economy, any effective development strategy must start from a reconsideration of the agricultural sector, for adapting it to a changing international environment. However, dealing with agriculture in Moldova means dealing with smallholders, which represent the depositary of local culture. If economic development has the objective of relieving as many families as possible from poverty, allowing them to live according to their desires and to build a decent future within their country, policymakers interested in achieving it for Moldova must take into account the needs of smallholders first. Otherwise, disappearance of the country through depopulation would be unavoidable, as provisional data of the 2014 Population Census threaten. However, despite the fundamental socio-economic role played by small farms, reliable statistical information on this phenomenon is still poor, or neglected. This happens because the national government and international agencies tend to shape their development strategy according to the needs of large farms, proposing farm growth, rather than intensification as the pivotal strategy for achieving economic success.

## 1.1.    Objectives of the Research

This dissertation focuses on the present situation of family farms in the Republic of Moldova and their evolution during last years. Important features of family farms are their small economic and land size, a prevalent subsistence function, partial market integration, and reliance on family labour. An alternative denomination is that of peasant farm. The word "peasant" not only implies a distinct way of production, characterized by non-separability of consumption (family) and production (farm) functions, but it also indicates a specific lifestyle, strongly related to the traditional rural world. At the ends of this dissertation, the population under research are, thus, Moldovan households who received land shares during privatization, but did not turn their farm into a commercial activity, although they keep producing food for fulfilling their family needs, and eventually sell surpluses to neighbours or in local markets.

Most studies on Moldovan farming sector date back to the 1990s and the beginning of the 21st Century. The first years after land reform witnessed a sharp decline in total agricultural production, due to the difficulties for the new farms to adapt to market conditions (Dudwick *et al.* 2007). A recovery was expected for 2003, but a severe drought hindered it. In the following years, massive outmigration started, and no constant monitoring of the impact of reforms took place. Therefore, the objective of this dissertation is to draw an overall picture of the family farms created by the land reform at a ten-year distance. By means of an *ad hoc* survey carried out by the author, and by analysing farm-related information contained in the *Household Budget Survey* (HBS) database, the author tries to assess the impact of land privatization on life choices of share recipients. In particular, the following pages enquire whether land ownership increased the wellbeing of Moldovan citizens. A number of issues are investigated, observing both the most recent cross-sectional data and the evolution of important variables over available years (2006-2013).

Here are important questions investigated using cross-sectional data. How do farm household members combine available resources (land and labour) in order to fulfil their survival needs? Do agricultural activities contribute to decrease rural poverty, and how? Which are the possible alternative livelihood strategies for farming families? At what conditions do small farms engage in market activities and which factors allow successful market integration?

The analysis of panel data allows the author to detect the main dynamics of the land market, and the consequent evolution of land use and ownership, thus speculating about the future role of small farms in Moldovan rural areas.

The results of the analysis are presented in two forms. The first one is a dense description of a model Moldovan farm household, based on the author's survey, which includes external conditions, available physical resources and their combinations, financial resources, farm output and its uses, and alternative livelihood strategies. The second one is a quantitative analysis based on the HBS database, which includes a description of the main sample features, an overview of farm evolution over time, a description of production strategies and of relationships between farm and family characteristics, and an assessment of poverty implications of farming and other alternative life strategies.

The final output of the analysis is a series of recommendations addressed to policymakers and other stakeholders involved in the reshaping the Moldovan agricultural sector. These include the Moldovan government, the European

Union and international agencies, like the World Bank and FAO. These recommendations take into consideration the needs of households that either want to turn their farms into a viable commercial activity, or prefer not to follow this path, while keeping producing for fulfilling family needs. For the latter, the main objective is to escape poverty by using family labour more efficiently. When performing this analysis, two key principle should be born in mind. First, any policy starting from premises defined externally from their recipients can barely improve their condition, and is rather pursuing other interests. Second, any strategy that foresees the abandonment of Moldovan rural areas by an even larger number of people, e.g. remittance-based solution to poverty, is not an option, since it implies the destruction of the world it pretends to help.

## 1.2. Relevance of the Topic and Innovations

Agricultural policies in post-communist and developing countries treat peasants as a residual socio-economic category that needs to integrate in the market in order to achieve wellbeing. Although it is undeniable that, in Moldova, accumulation of economic resources is necessary in order to improve basic services (e.g. the sanitary system, or transport infrastructures), the author matured the feeling that development objectives are determined irrespective of their pretended beneficiaries, with a top-down, paternalistic approach. Hence, they do not take into account their aspirations and the determinants of their wellbeing. This dissertation aims at filling the gap of knowledge of peasant economy in the Republic of Moldova, and tries to do it by enquiring the point of view of peasants themselves.

This topic is relevant for several reasons. First, as mentioned above, Moldova is the poorest country in Europe; therefore, international institutions have the moral duty to act for improving the wellbeing of its population, possibly by taking into accounts their aspirations. Instead, after a decade of overexposure, when international aid agencies helped shaping the reforms, which determined the present conditions, countries lagging behind were mostly abandoned to their destiny, rather than monitoring their path more attentively. An assessment of the result of land privatization 25 years after the approval of the Land code is thus necessary. Such necessity is even more pressing for Italy, since this country represents the first European destination of Moldovan migrants. At the end of 2014, the number of Moldovan citizens residing in Italy was 147,388, which is heavily underestimate, since many of them are registered as Romanian citizens[2]. Although this figure is not so relevant for Italian standards, it accounts for 5.1% of Moldovan population. A structured institutional interest for this country would help Italians to better understand people who often work in their houses, providing interesting investment opportunities, instead of leaving them to a small group of rapacious businesspersons. Third, the Association Agreement between Chişinău and the EU started a process of adjustment of the Moldovan economic system to European standards, which will concern mainly the Moldovan agricultural and food sector and require expertise from both sides. This path cannot be taken for granted, as Russia is reorganizing its trade relations with neighbours through the Eurasian Economic Union. Until the recent quarrels resulting in Moscow banning Moldovan agricultural products, Russia represented a secure external market for Moldovan wines and fruits. Even FAO recognizes the need for Moldova to elaborate an effective trade strategy for mitigating the heavy social consequences of the loss of the Russian market, at least as long as the EU market is not open to Moldovan agricultural products due to quality and safety concerns[3].

From the theoretical point of view, this dissertation is innovative since it tries to adopt the approach of peasant economics. Although one of the funders of this branch of economics, Alexander Chayanov (1888-1937), was from Russia and took inspiration for his studies from the condition of the Russian peasantry at the beginning of the 20th Century, this approach was mostly adopted for analysing developing countries after WWII. The agricultural sector of communist States was out of range for Western economists and was, therefore, neglected, especially the one of the peripheral countries. After the collapse of the USSR, the transition paradigm was coined, and used for interpreting

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[2] Istat, http://demo.istat.it/str2014/index.html [Accessed: 10th November 2015].
[3] The author took part in a seminar at FAO Trade and Market Division in January 2015, when a lecturer chose the Republic of Moldova as a case study due to its delicate trade situation.

**Figure 1. Conceptual scheme of the dissertation.**

**Motivations**
- Poverty (poorest European country)
- Agricultural country; large rural population
- Emigration only alternative to farming

**Key issue**
Family farming plays an important social role, but is neglected by policy makers (pro-large farms bias).

**Research question**
Considering the current situation of the family farms created by the land privatization program in the 1990s, and the initial expectations of the recipients, does the former correspond to the latter?

**Sub-questions**
- Is it possible to detect farm clusters (location, size, and commercialization) among family farms?
- How are farming families combining their resources in order to obtain farm income?
- Which is the impact of land ownership on family wellbeing and poverty levels?
- Is there any clear emerging pattern as for land distribution and market integration?

**Framework**
1. Peasant economics: family farms are not businesses (labour-consumption balance principle)
2. Post-communist transition: resource grabbing in a weak institutional framework
3. Farmers motivations: the situation needs to be assessed with regard to problems and aspirations of the key stakeholders (drivers of farmers' choices)

**Methodology (general)**
Author survey (qualitative and quantitative) aiming at:
1. Describing the typical Moldovan family farm (structure, resources, output)
2. Assessing the drivers of farmers' choices and their objectives (principal component analysis)

**Results (general)**
1. Nuclear family; surplus of labour, low mechanization, lack of credit, different land "shares" […]
2. Focus on survival, fatalism, preference for homemade food, rural life, tradition, independence

**Methodology (particular)**
- Grouping of farms according to key variables; test on the equality of means.
- Linear models (logarithms); decomposition of farm outputs, sales, expenditures.
- Counterfactual incomes and life levels through propensity score matching; poverty indexes.
- Markov transition matrices; multinomial logistic regressions.

**Results (particular)**
- Family features correlated with farm variables; market integration positively correlated with income; location patterns observed
- Absence of positive scale economies (decreasing labour and land productivity); wine and dairy more often marketed.
- Farming income is small, but it impacts on the lowest quartile, decreases poverty and inequality, and increases life satisfaction.
- No clear cluster of successful agricultural businesses is emerging; small farms are caught in a poverty trap.

**Discussion of the results**
- Family farming is a complex social phenomenon, which cannot be understood by separating the production and the consumption unit.
- Larger farms are less efficient; expenditures are higher for them; cows are an important means of investment.
- If land ownership is not protected, serious social problems and depopulation problems may arise in the future.
- There is no space for farm growth in the short term; land property slowly transferred to corporate farms.

**Recommendations**
1. Secure international markets by negotiating with both EU and Russia (export-driven development)
2. Favour farm intensification through small projects for potential businesses, rather than farm growth
3. Use the rental market as the main instrument of land consolidation and keep a fair land distribution
4. Overcome supply atomization by stimulating producer cooperatives and local collection points
5. Treat land as a substitute of welfare for vulnerable groups, subsidizing inputs for them

economic events in this area. A quarter of century after the transition to market economy, this paradigm is probably out of date. As a result of economic and political reforms implemented in the last decades, winning and losing countries emerged. The Republic of Moldova is among the latter, at least for Western standards. Pro-independence forces that promoted the land reform aimed at returning to a supposed "golden age", corresponding to the decades before the creation of the Moldovan SSR, the same when Chayanov wrote his works. Therefore, the paradigm of peasant economics is the most suited for Moldova, whose peasantry was *recreated* by land privatization. Peasants experience a transition too, but it takes place from subsistence to the market, rather than from centrally planned economy to it. However, in the Moldovan context, important legacies of socialism, like the expectation of State intervention in the economy, and materialist values, are also observed. This represents the first attempt, so far, to adopt a peasant approach in studying the agricultural sector of a post-communist country.

From the methodological point of view, this dissertation makes several important choices. First, a strict definition of originality is adopted, according to which the work must be self-standing, from data collection to policy recommendations. Indeed, in a developing country, data collection represents often the most difficult aspect of a research. Only by collecting his data in person (or through trusted delegates using his survey), a researcher is able to define research priorities, ask the right questions, and avoid intermediations with potential distorting effects, especially in a politicized context like today's post-Soviet countries. As explained in the third chapter, due to objective difficulties and lack of funding, the number of collected interviews is limited (126); therefore, it is necessary to rely on the HBS dataset. However, due to their ambiguous nature of controlled (by international aid agencies) and controllers, and to the widespread mistrust of the population, institutional actors cannot detect all of the information collected through the author's survey. A second aspect of innovation is then represented by the focus on the drivers of farmers' production and consumption choices, and on the determinants of their wellbeing. This is done by inserting in the survey questionnaire a 31-item Likert scale on farmer motivations, and by identifying the determinants of household life level other than income. Indeed, coherently with what mentioned above, a common risk when dealing with peasants is to define development strategies that are external to their pattern of thinking. Third, a strong focus on the relation between family and farm characteristics is present all over the analysis. Indeed, non-separability of consumption and production is a fundamental principle in peasant economics. Finally, even if the timespan of the sample is too short for modelling farm exit and the panel is a rotating one, a focus on changes of key variables over years is also present.

## 2. Review of Literature

The agricultural sector of the Republic of Moldova may be observed from two different points of view: that of the post-communist transition paradigm, and that of peasant economics. The former focuses on the reforms that guided the agricultural sector from centrally planned economy to market economy. The latter, which before the collapse of the socialist bloc was used mainly in the context of developing countries of Africa and South-Eastern Asia, concerns the nature of the socio-economic units operating in the sector, i.e. peasant farms. Indeed, as a result of the dismissal of collective agriculture, the sector returned to a situation similar to that of pre-revolutionary Russia analysed by Alexander Chayanov, where a large number of families based in rural areas, and having access to land, produce almost exclusively for self-consumption, eventually struggling to integrate their farms into imperfect markets. It is undeniable that a so widespread distribution of land ownership would not have been possible without the external intervention of the USSR, which confiscated the land to large peasants and proprietors, and collectivised it. Between 1946 and 1951, the number of collectivised peasant households passed from 0.1% to 97.0%, corresponding to 1,387 and 1,526,438 hectares of land respectively (Gribincea 1996, p. 102). After independence, agricultural workers received land shares. However, the focus of this dissertation is not on the process of land distribution, but rather on its result, i.e. the present conditions and potential developments of the family farms created by the reforms.

### 2.1. Agricultural Transition and Peasant Economics: From Chayanov to the USSR, and Back

After a short overview of agricultural transition in Central Eastern Europe and the former USSR, this paragraph focuses on the concept of peasant farm, describing its main characteristics. These include the prevalent use of family labour and limited market integration. Usually, policies addressing the familial farming sector in developing countries aim at making peasant farms move «from relatively dispersed, isolated and self-sufficient communities toward fully-integrated market economies» (Ellis 1993, p. 5).

Before independence, the familial farming sector played a secondary role in Moldova. However, the share of its output on total agricultural production (18%) was larger than the share of land used by families (7%) (Rozelle and Swinnen 2004, p. 426). Such situation changed radically after the collapse of the USSR and the implementation of the reform agenda for agriculture. Such agenda was based on «the general *economic transition paradigm*», which in every country that followed it, was including «the elimination of central production targets, the liberalisation of prices and trade regimes, the introduction of hard budget constraints, and privatisation of non-land farm assets and agricultural land, as well as enterprises engaged in agricultural input supply (farm machinery, fertilizers, fuel, seeds, animal feed), food processing and retailing» (Wandel *et al.* 2011, p. 141). These processes took place also in Moldova, although the focus was on «land privatization in the strictly legal sense of "destatization" of land ownership» (Lerman 2009, p. 317), which became almost synonymous with agricultural transition. Most CIS countries implemented the same path. As of 2009, only in Belarus, Uzbekistan and Tajikistan the ownership of land was exclusively public, while Turkmenistan allowed «a curious form of private land ownership that rules out transferability» (Lerman 2009, p. 317), thus lacking the main feature of private property. During the post-communist decades, scholars focused on the assessment of the results of transition. Several indexes aimed at measuring the quality of institutional change towards a fully-fledged market economy were created. Among them are the Transition Indicators of the EBRD, according to which, in 2005, Moldova scored above the average, especially compared to the rest of the CIS, and particularly well as for the privatization of agro-processing and input supply (Wandel *et al.* 2011, p. 143). Although they recognize the limits of this index in detecting all dimensions of the reforms, Rozelle and Swinnen (2004) choose productivity as a benchmark for assessing success and failure of transition. As long as productivity is concerned, Lerman and Cimpoieș (2006) and Lerman and Sutton (2008) found that Moldovan small individual farms are more efficient and productive than large corporate one, and they point out that similar studies on the agricultural sectors of Russia and of the USA confirm this conclusion. Moreover, using data from a World Bank survey conducted in Moldova in 2004, Van Landeghem *et al.* (2013) demonstrate that, regardless of total farm production, land

ownership, and equality of land distribution (i.e. an average size of neighbours' plots in line with that of respondents) have a positive effect on the subjective wellbeing of farmers. However, Dudwick *et al.* (2007, p. X) remember that, «though land reform may potentially contribute to pro-poor growth by increasing farm efficiency and by distributing land widely, it is only one of many important complementary reforms and cannot be expected to stimulate sustainable pro-poor growth by itself». Indeed, the land reform represents the precondition for the creation of individual farms, but then, coherent government policies for protecting and developing this sector should follow suit.

The pro-Romanian nationalist movement that promoted the independence of Moldova assigned huge significance to land distribution as a factor for recovering the "original" native culture. Citing the Moldovan historian Ion Pelivan (who was a local landlord) in his book about land collectivisation under Stalinism, Gribincea (1996, p. 13) affirms that czarist Russia and, by extension, the USSR, not only imposed harsh economic conditions, like the Turks before, but also «tried to defile [Moldovan] soul, to mock [their] language, and to kill [their] ethnic identity». The relation between the condition of being a peasant, and Moldovan identity emerges clearly from these words. Indeed, the social importance of farming and of the agrarian question in general is confirmed by the context of the first free parliamentary elections, which took place in 1994. The Agrarian Democratic Party (PDAM), which included most member of the rural nomenclature, i.e. directors of Soviet collective farms, obtained an absolute majority, while the inspirers of the nationalist movement ran as the Bloc of Peasants and Intellectuals, proving the strong spiritual ties between the cultural *élite* and the peasantry. The following land reform was successful in recreating a large class of peasants; therefore, the present conditions of family agriculture will be analysed within this second framework.

Chayanov was the first economist to focus on peasant farms as a specific economic category. Working in post-revolutionary Russia, he supported the peasant farms, opposing the main Marxist thinkers from Russia and Western Europe. According to Marxists, the peasant is both a capitalist, being the owner of the means of production, and a salaried worker; in the societies where a capitalist way of production dominates, the peasant should transform into a small capitalist who exploits someone else's work, or he will lose his production means and become a pure salaried worker. Instead, according to Chayanov, assigning to peasants the attributes of the capitalists and the workers is «a pure capitalist fiction» (Segré 1994, p. 89), since these are conceivable only within a capitalist system. Hence, viewing the peasant farm as a profit-maximizing business generates serious misunderstandings. Using his words:

> To pass, even for a short time, from figures of the "Collection of statistical and economic information on agriculture in guberniya" to concrete, practical work among living peasant farms is enough to doubtlessly convince oneself that one must master more than the totals of classifications by sown area and the correlation coefficients of its elements to understand the peasant farm. [...] One must seize hold of its living organizational ideas, the machinery of its individual economic organism, which is "the subjective teleological unity of rational economic activity, i.e. running the farm". In brief, we will fully understand the basis and nature of the peasant farm only when, in our constructs, we turn it from an object of observation to a subject creating its own existence, and attempt to make clear to ourselves the internal considerations and causes by which it forms its organizational production plan and carries it into effect. (Chayanov 1966, p. 118).

The main point of disagreement between Chayanov and Lenin was the issue of hired labour: according to the former, in 1900-1920, 90-95% of Russian farms were not hiring any worker; instead, the latter believed that this practice was widespread, which was proving that a peasant bourgeoisie was dominating the countryside. Any economic unit aims at maximising its income; however, the possibilities of expansion are practically boundless for a labour hiring one, since its only limit is the availability of capital. Instead, the family farm, apart from capital, founds two absolute constraints in familial labour force and the increasing drudgery of work. The search for an equilibrium between family needs and the drudgery of labour represents what Chayanov calls the *labour-consumption balance principle*. Thanks to systematic accounting, capitalist farms can easily assess whether the final objectives in terms of returns are met, while the family farm bases its work on a subjective evaluation, drawing from the long experience in agriculture of the living generation and its ancestors. Data from the 2011 Moldovan Agricultural Census confirm this circumstance: only 708 family farms out of 898,768 (0.08%) kept accounting; this percentage is even lower among farms with a total agricultural area under 10 hectares (95 out of 895,685, or 0.01%).

In previous pages, the expressions "peasant farm" and "family farm" were used interchangeably. Nevertheless, the former holds additional socio-cultural implications: all peasant farms are family farms, but the contrary is not necessarily true. Chayanov used the expression "family labour farm", in which «no wage labour is hired, and which thus differs fundamentally from the capitalist one» (Chayanov 1996, p. 273). Generally, a peasant farm is «an economic unit that makes a living from the land, through its activities may also take place in non-agricultural sectors, mainly *crafts and trades*» (Chayanov 1996, p. 273). The definition of the family farm is the same, the main difference being that «some writers use this term for capitalist family farms, which may, of course, hire wage labour» (Chayanov 1996, p. 273). The family is a group, which does not necessarily coincide with the nuclear family, while the farm is «a production and consumption unit that makes its living from the land, sometimes with supplements from non-agricultural sources» (Chayanov 1996, p. 273).

During the 20th Century, the studies on peasant farms multiplied. Most of these works associate these farms with a number of features deemed undesirable by the neoclassical theory of farm production: a small land size, a prevalent focus on self-consumption, use of traditional inefficient production strategies, a limited permeability to innovation, low capital input, etc. The main aim of policies is to help peasant farms to turn into viable family farm enterprises, thus freeing underemployed agricultural labour force, which can be employed more efficiently in other economic sectors. Applied to the Republic of Moldova, this framework implies that the rural population is moving towards market economy not from a centrally planned economy, but «from relatively dispersed, isolated, and self-sufficient communities» (Ellis 1993, p. 5), created by the dismantling of the Soviet agricultural system.

Integrating economic and anthropological aspects, Ellis (1993, p. 13) formulates a comprehensive definition of peasants as «households which derive their livelihood mainly from agriculture, utilise mainly family labour in farm production, and are characterized by partial engagement in input and output markets which are often imperfect and incomplete». Almost exclusive reliance on family labour remains a key aspect in defining peasant farms; however, it is possible to partially overcome this constraint through non-market, reciprocal transactions, like the exchange of labour, which will be illustrated more in details while describing the typical Moldovan family farm. According to Ellis (1993, p. 11), «reciprocity refers to exchanges which are culturally defined, non-replicable between one event and the next, and involve unlike goods and services». In Ellis' definition, the focus on imperfect market integration becomes crucial: apart from the labour market, this refers also to market of agricultural output. Indeed, family farms are usually producing mainly for fulfilling family needs, i.e. they are "subsistence" farms. This concept is explained more in details in the following paragraph. Subsistence can anyway exist alongside «high specialization in commodity production» and «derivation of a significant share of family consumption from non-farm income-earning activities» (Ellis 1993, p. 12). As explained in the following chapters, Moldovan farms are pursuing the latter rather than the former strategy: they tend to differentiate their income off-farm, while keeping producing a large portfolio of agricultural products. These two trend do not exclude the family from the peasant category, if the other features included in the definition persist.

The Food and Agricultural Organization of the United Nations declared 2014 the *International Year of Family Farming*. On this occasion, the following definition of family farm was used:

> Family farming (which includes all family-based agricultural activity) is a means of organizing agricultural, forestry, fisheries, pastoral and aquaculture production which is managed and operated by a family and predominantly reliant on family labour, including both women's and men's. The family and the farm are linked, co-evolve and combine economic, environmental, social and cultural functions. (FAO 2014, p. 9)

Once again, the connection between the production unit (the farm) and the consumption unit (the family) through labour is a key issue in defining family farms. Moreover, its social and cultural functions are clearly recognized.

Ellis (1993) illustrates five different theories of peasant economic behaviour. Indeed, peasants maximize their wellbeing not only (or not primarily) with regard to profit, but also to other family objectives. The first stylized type is the "risk-averse peasant". He is usually unwilling to adopt innovations, which results in sub-optimal economic decisions and prevents profit maximization. Second, "drudgery-averse peasants" (a figure inspired by Chayanov's

theories) take their production and consumption decisions simultaneously. They consider the farm as part of their household rather than a business concern; therefore, the cost of labour is subjectively determined based on family structure, and family members have a relative preference for free time. An evolution of this theory is that of the "farm household peasant". In this case, the introduction of a labour market causes family members to take into account the opportunity cost of making an alternative use of their time; moreover, they can hire off-family agricultural labour. "Profit-maximizing peasants" act according to the principles of the neoclassical economic theory, efficiently allocating available resources in order to maximize family income: if such perspective is adopted, family farms are assimilated to ordinary capitalist enterprises. Finally, "sharecropping peasants" can be found where land property is concentrated in the hands of a few big landowners, so that the former have to work for the latter, obtaining a share of the crop in exchange. Due to the widespread distribution of land property, this last type is virtually absent from the Moldovan panorama, while the author's survey detected elements of the previous four types, as illustrated in the fourth chapter.

In the 1950s, the Japanese economist Chihiro Nakajima translated Chayanov's study into a systematic economic theory, called the «subjective equilibrium theory of the farm household» (Nakajima 1986), due to the role of family subjectivity in evaluating the labour-consumption equilibrium. Then, Barnum and Squire (1979) further developed this theory, whose econometric application are the agricultural household models. These models assume that the family farm maximises its wellbeing (utility) with regard to several constraints. Household family utility is a function of the so-called Z goods (i.e. commodities produced and consumed by the family that are not commercialized, since no market exists), leisure time, subsistence agricultural output, and market purchased goods. The existence of the Z goods causes the objective difficulties in separating housekeeping duties (e.g. collection of wood for winter) from related agricultural tasks (e.g. pruning fruit trees). The same difficulties emerge when attempting to separate the purchase of consumption goods from that of farm inputs (e.g., a rototiller may be used for both tilling farmland and pulling a cart toward the closest town). As for the constraints, these include a time constraint, a budget constraint, and a credit constraint. The time constraint assumes that the total time devoted to farm labour, to production of Z goods, and to off-farm employment cannot overcome total available family time (that depends on household characteristics). The difference between family time and labour time is leisure time; if a market of agricultural labour exists, family members can either sell their labour, or increase their time endowment by hiring external labour. The budget constraint states that total expenditures cannot overcome total entries. Among the former, are self-consumed farm output and expenditures for market-purchased goods; among the latter, are farm profits (or losses), earned income (wages, self-employment earnings, etc.), non-earned income (pensions, and other State transfers) and remittances, which occupy a mid-position between earned and non-earned income. Farm profit is given by the difference between farm production (both marketed and self-consumed), and expenditures for variable inputs and the net land rent. Obviously, in order to obtain an output, the farmer uses land, labour, and variable inputs, according to a combination that is synthetized within the production function. Finally, the credit constraint models the lack of financial means that the majority of small subsistence farms experience. Agricultural household models were used mostly for studying the South-Eastern Asia environment, including Malaysia (Barnum and Squire 1979) and Indonesia (Benjamin 1992), of sub-Saharan African countries, like Nigeria (Singh *et al.* 1986) and Tanzania (Tiberti 2012). The main characteristics of these households, compared to Moldovan ones, is that they focus almost exclusively on one agricultural output, usually paddy (rice), so that the model includes a single product.

The household model is extremely demanding in terms of data and computational complexity; hence, Sadoulet and De Janvry (1995) suggest avoiding using it if no market failures are observed and the scholar is interested only in the production side of the farm household. Instead, if the focus is on the consumption side, the added value of a household approach is worthwhile only if three conditions apply: «farm profit effects due to price changes are large»; «farm profits are a large share of full income»; and «the income elasticity of the commodity that is of interest of the analyst is high» (Sadoulet and De Janvry 1995, p. 159). In Moldova, price changes have probably a limited effect on farm profit, since farm output is very diverse and only a small share is marketed; and farm income represents a

small share of total family income on average. Moreover, the focus of this dissertation is not on prices, but rather on the motivations of farmers and the role of agriculture for their overall wellbeing.

Family farms show a pronounced resilience: they keep cultivating their land despite small farm profits and high risks, and are handed down to the following generation of farmers. Hannson *et al.* (2013) state that two groups of factors motivate farmers' decisions: negative "pushing" ones, which derive from necessity, and positive "pulling" ones, related to potential opportunities. As for the first, family farming in post-communist countries is often motivated by a lack of alternative income sources, especially in the countryside; therefore, creating new employment opportunities assumes a key role in fostering rural economic development (Abele and Frohberg 2003). Currently, although family farms are often unprofitable from a business perspective, «it is generally agreed that they are important in providing food and shelter for both resident families and urban-based relatives during periods of structural change, such as during a transition period» (Fritzsch *et al.* 2011, p. 70-71). Positive "pushing" factors are more complex, as they refer to what Chayanov (1966, p. 118) defines «the living organizational ideas» of family farms. After having detected the drivers behind the choice of farmers to comply with rural, agricultural, and food standards, Herzfeld and Jongeneel (2012, p. 259) point out «the limits of the expected utility framework» and the key role of «psychological and sociological» factors, «such as intrinsic motivations, moral convictions (e.g. obeying laws, stick to one's given word), social preferences, reciprocity and impacts of peer groups». Hence, they suggest undertaking further empirical analyses, using different approaches. This dissertation embraces their suggestion and, therefore, aims at turning Moldovan family farms «from an object of observation into a subject creating its own existence» (Chayanov 1966, p. 118), by detecting the drivers of farmers' motivations and assessing family conditions with a view to them. This is urgent for two main reasons: an overall low responsiveness of peasant farms to policy incentives, due to their «ability to disengage from the market» (Ellis 1992, p. 13), and an ill-concealed «preference for large-scale corporate farms» (Lerman and Cimpoieș 2006, p. 14) by the Moldovan government. Studying farmers' motivations will help framing policies corresponding to their own needs and guarantee their effectiveness.

Nevertheless, as mentioned above, agricultural policies in developing countries are usually designed «either to reduce the relative autonomy of peasants, or to overcome the imperfections in input and output markets that they confront» (Ellis 1992, p. 13). This is equivalent to facilitate their transition from relative self-sufficient communities to full-fledged markets. A keyword at this regard is "innovation", i.e. «a process through which farmers improve their production and farm management practices», which «may involve planting new crop varieties, combining traditional practices with new scientific knowledge, applying new integrated production and post-harvest practices, or engaging with markets in new, more rewarding ways» (FAO 2014, p. X). Innovation can favour farm intensification, i.e. the capacity of obtaining a larger output per unit of input, thus generating larger, potentially marketable surpluses. This can be seen as an alternative to farm growth as the main strategy for market integration. Although peasant farms are often defined "backward" or "traditional" in opposition to "advanced" and "modern" agriculture, many of their farming practices are truly innovative, representing «ingenious adaptations to survival within difficult environments» (Ellis 1993, p. 13), or in a situation of harsh economic conditions. The author's survey detected several of these examples, mentioned in the fourth chapter.

For concluding, a focus on possible directions of development of semi-subsistence and small farms is necessary. These are disappearance, transformation, and continuation. The first path can take place either through absorption into larger commercial farms (usually corporate ones), or through abandonment of land, especially in remote areas. Transformation can take the form of deeper market integration, by increasing the share of commercialized output, so that the peasant farm becomes a capitalist business. Finally, continuation as a small subsistence farm is possible in three ways: by diversification on-farm (e.g., cultivating different crops) and off-farm (e.g., opening an agritourism); by diversification of family income through non-agricultural employment, so that farming becomes a part-time side activity; or through the return of successive generations due to the lack of alternative working opportunities, without changing the farm technology. The EU Commission Directorate-general for Internal Policies (2013)

detected these paths in EU member States, especially Central and Eastern European and Mediterranean ones. Another project, which involved some post-communist EU countries, individuated four typologies of farms: part-time (when family members have off-farm jobs), subsistence (e.g. pensioners, and vulnerable people), small commercial (which earn a consistent share of their income in money), and large commercial. All these patterns and categories are observed in Moldova, depending on household characteristics and location. However, the three paths seem to take for granted that small size and subsistence orientation are undesirable conditions; instead, they can coincide with the «intrinsic motivations, moral convictions [and] social preferences» (Herzfeld and Jongeneel 2012, p. 259) of farmers.

This paragraph outlined the framework within which the Moldovan individual agricultural will be observed. In particular, farmers' preferences and the impact of farming on family income and wellbeing will be enquired, looking at family farms as «subjects creating [their] own existence» (Chayanov 1966, p. 118), rather than profit-maximizing businesses. This will allow assessing in which direction they are developing, and whether there is still a space for peasant farms in a country that chose a capitalist economy despite considering the peasantry as the soul of its culture.

## 2.2.     Key Concepts: An Operative Definition of Farm and Subsistence

This paragraph provides an operative definition of key concepts, which will be used in the next chapters, taking into account the theoretical framework defined in the previous paragraph, and the local context. Since the activity of conceptualization is treated as endogenous, many concepts are defined based on the results of the author's survey. Hence, reading of the result of the author's survey could help to frame them and to better understand their genesis.

The first necessary step is defining the object of research. This was made by looking at the most comprehensive study of the Moldovan sector undertaken until now: the 2011 Agricultural Census. Census units were "agricultural holdings", i.e. «technical economic units (with or without juridical status) having a single management and carrying out agricultural activities by utilizing agricultural land and/or livestock breeding or activities related to maintenance of agricultural land in good agricultural and environmental conditions, whether as principal activity or as a secondary activity» (NBS 2013a, p. 367). This broad definition includes both "agricultural holdings with juridical status" («agricultural cooperatives, joint stock companies, limited liability companies, State enterprises, other types of holdings» [NBS 2013a, p. 367]) and those "without juridical status" («registered peasant households (farmer)/entrepreneur, and other type of households» [NBS 2013a, p. 367]). The Census covered the entire territory of the country, with the exception of the Territorial-administrative Unit of the Dniester Stripe, and the city-district of Bender (i.e. the territories controlled by the self-proclaimed Republic of Transnistria). This research adopted the same territorial focus. In addition, the Census did not consider economic units providing agricultural services (mechanization, irrigation, etc.) without farming any land; they were excluded also by the author's survey and, whenever possible, earnings from these activities are excluded from farm income (e.g. in the 2013 farm output).

The "agricultural holdings with juridical status" are not associated to a specific household and operate according to market rules. The Census detected 3,446 such units, with an average size of 369.3 hectares. The large majority of them (1,986; 57.6%) are limited liability companies, followed by agricultural cooperatives (204; 5.9%), joint stock companies (158; 4.6%), and State enterprises (89; 2.6%); the rest are other types of holdings. They are not the object of this dissertation; hence, from now on, when farms are named, the text refers to agricultural holdings without juridical status. This condition is deemed a proxy of being a family farm. Although family farming is usually associated, by economists, with a subsistence focus, a small size, and use of traditional production methods, the Census detected 3,083 holdings without juridical status with more than 10 ha of farmland, out of 898,768 (0.3%). These are likely to be market-oriented, i.e. different from the type of family farms described in the previous pages. However, in order to draw a better picture of the whole familial agricultural sector, no upper bounds were set. Indeed, the probability of selecting at least one of such farms is extremely low: as explained more in details in the following chapter, the author's survey includes only three farms with more than 10 ha (2.4%), while the HBS sample includes only 47 of them (0.1%) over the whole 2006-2013 period.

As for the consumption side, Ellis (1993, p. 14) describes the household «a social unit defined by the sharing of the same abode or hearth». Household is used as a synonym of family. At the ends of this dissertation, the family is, thus, a unit with a single will, regardless of the contrasts that may arise when taking difficult decisions (e.g. migration), or when the aims of one of its members are strongly in contradiction with the majority. The decision-making strategy is not a topic of discussion. As a result, available family resources, including labour time, correspond to the sum of individual ones, and single members are not entitled to dispose freely of their part. This strategy is consistent with the strength of family ties in rural Moldova, and with the prevalence of family wellbeing over individual one.

Previous paragraphs defined the family and the farm separately. However, according to the labour-consumption balance principle, the consumption unit is not separable from the production unit. In order to express this concept, English language uses a number of two-word expressions (family farm, farming family, farm household, agricultural household, etc.) that give pre-eminence to one of the two sides (either the family or the farm). Instead, the Romanian language uses the word "*gospodărie*" (household), often associated with the term "*țărănească*" (peasant). The Explanatory Dictionary of Romanian Language defines a "*gospodărie*" as «the totality of goods which make the real estate of a resident, especially of the countryside (and of his family); a house»; «unit of the residence and the relatives who occupy it, living together; relatives who live together, having a common budget and taking common advantage of the goods obtained through their labour»; «(archaic) unit of agricultural production, service provider, etc.»[4]. These definitions demonstrate the indissoluble link between the agricultural activities and the family in the local culture.

Indeed, the term "*gospodărie*" is used in the survey *Agricultural Activity of Small Agricultural Producers in the Republic of Moldova* of the National Bureau of Statistics (NBS), which clearly associates family farming with a small land size. Within this survey, "small agricultural producers" include «individual auxiliary households and farms with land plots of up to 10 ha, registered in the established way, and persons who were given parcels in the counterpart of shares of equivalent land, but did not register their household in the established way»[5]. These are divided in two groups: "individual auxiliary households" (*gospodăriile personale auxiliare ale cetăţenilor*) and "farms" [*gospodării ţărăneşti (de fermier)*]. The former are production units, that use house plots and gardens, or grow animals and poultry, relying on labour of family members, in order to meet their nutritional needs and other needs. The latter are «a form of entrepreneurial activity performed by using land plots and the patrimony in private ownership or in use of the farmer, which deals with production, processing, and sale of agricultural output, [including] persons who were given land parcels in the counterpart of shares of equivalent land, but did not register their households in the established way»[6]. Therefore, Moldovan families have access to three different land types: house plots, "gardens" or "small shares", and "big shares". During the author's survey, the impression was that people who were not farming their big share did not perceive themselves as proper farmers. However, after grouping farmers according to use of this type of land, no significant differences were observed: families can earn a consistent income from agriculture and dedicate a large amount of time to it even without using their big share. Hence, the division used by the *Small Producers* survey is not considered, and all farms are analysed together. At the ends of this dissertation, "*farms*" are, thus, family farms, i.e. households who farm a quantity of land different from zero, regardless of the property of this land and of the size of farm income. Due the specific Moldovan conditions, these farms are also small and mainly subsistence-oriented.

Every Moldovan citizen entitled to land was awarded land property during the privatization process. House plots are located around the family house, inside the rural or urban settlement, while "gardens", also called "small shares", are situated outside these localities. Both of them were awarded based on articles 11 (82) and 39 of the Land code. "Big shares" are shares of the value of the assets of Soviet collective farms, allocated to former agricultural workers as equivalent land plots, based on article 12 of the Land code, and article 2 of the Law for amending and

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[4] Institute of Linguistics of the Romanian Academy, https://dexonline.ro/definitie/gospod%C4%83rie [Accessed: 13th October 2015].

[5] NBS, http://www.statistica.md/public/files/Metadate/en/Mici_Producatori_Agricoli_en.pdf [Accessed: 13th October 2015].

[6] *Ibidem* [Accessed: 13th October 2015].

completing the Land code (Law No. 173 of 22.10.1998). These types of land are not qualitatively different, and can include both arable land and permanent crops (orchards or vineyards); instead, pastures are owned by local authorities. The sum of the house plot and of all small shares and big shares assigned to family members makes up the "*owned land*" of the family farm. "*Rented-in land*" (i.e. land rented from other smallholders), and owned land together represent what is called "*total land*". Although this variable counts twice the land under rental agreements (provided that family farms, rather than corporate ones, are involved in this transaction), it has the pragmatic function of calculating shares of different types of land. By subtracting "*leased land*" (i.e. land rented out to other farmers, often corporate ones) from owned land, and summing rented-in land, "*available land*" is obtained. It can be also called "*total farmland*" of the farm (in Italian: "*superficie agricola totale*"), and represents the physical limit of production in the short-term (since leasing contracts last for a minimum of three years). By excluding "*abandoned land*", it is possible to obtain "*farmed land*" (in Italian: "*superficie agricola utilizzata*"), i.e. the land which is actually used by families given their production needs, and whose value is used for selecting family farms. Farm sizes are assessed with regard to farmed land, and may be small, mid or large, based on the thresholds described in the fifth chapter. Size categories must be understood within the Moldovan context, and in particular in relation to familial agriculture. According to the 2011 Census, the average area of farmed land among active family farms was 0.77 ha, that is very small even in comparison with the size of Italian farms at the 2010 Agricultural Census (9.19 ha), which, in turn, is very small for Western European standards. Thus, when speaking of large farms, this term indicates family farms, which are larger in comparison with the average Moldovan family farm, with reference neither to international standards, nor to Moldovan corporate farms.

Another key term is subsistence. According to Heidhues and Brüntrup (2003, p. 1), when associated to agriculture, this concept is used as a synonym of «traditional, small scale, peasant, low income, resource poor, low input or low technology farming». Moreover, it is used for referring to both the level of market integration and the living standard of the households under study, and may be measured with regard to either consumption or production. At the ends of this dissertation, subsistence refers to the share of farm production devoted to family consumption; hence, farmers that produce mostly for fulfilling the nutritional needs of their families are defined subsistence farmers. Among them are both full-time ones, which earn their income mostly from their agricultural activity, and part-time farmers, whose livelihoods are centred on the non-agricultural sector (hobby farmers, large households whose members engage in different activities, etc.). The former correspond to the traditional understanding of subsistence farming, and present many attributes judged negatively by the neoclassical economic literature. Setting a threshold between subsistence and market orientation is, however, an arbitrary process. Usually, the 50% line is used; instead, Doppler (1992) identifies three categories: subsistence farmers sell less than 10% of their output, market-oriented ones sell more than 90%, and those in the middle are named "transitory" (not to be confused with the "transitional" farms identified in the sixth chapter). During the harvest seasons, farmers producing for themselves may eventually sell agricultural surpluses, also due to the lack of storage facilities. Hence, setting the threshold at the level of no commercialization would exclude from the subsistence category several farms that are clearly subsistence-oriented. On the other hand, the share of family farms which market over 90% of their output is too limited (5.2% of those that declare their farm income) for treating them as a representative sample of this group. Therefore, only the 10% threshold is used: farms selling less are called "*subsistence farms*", those selling more either "*semi-subsistence*" or "*semi-commercial*". The latter category ranges from 10% to 100% marketed output, thus encompassing very diverse units. However, the focus of this dissertation is rather on the social role of farming: market integration is only one out of several options available to agricultural households, and not always the one preferred by farmers.

# 3. Data Collection and Methodology

A farmer takes sits in front of the interviewers; he was told that the interviewers are foreigners.
Farmer, to the person who took him there: «What should I answer?»
One of the interviewers, who indeed could speak Romanian: «We will explain you in a moment. Tell us what you do every day, tell us only the truth».
Farmer, surprised: «Really!? You want to hear from me the truth about my agricultural work!?»

The National Bureau of Statistics of the Republic of Moldova collects data on agriculture regularly. Some general information may be detected from the *Statistical Yearbook*, published every year, while the first General Agricultural Census since independence was carried out in spring 2011, with the support of FAO. The dualistic structure of the Moldovan agricultural sector implies that different strategies for data collections need to be used when dealing either with large corporate farms or with small family farms. The former play an important economic role, as they represent the export potential of the country, but the effects of their activity on the population as a whole is limited, since the growing use of foreign-produced agricultural machinery reduces their labour requirements and, therefore, the spill-over effects on rural economy. The latter play a fundamental social role, since their production is distributed among the rural population and family farming is a key component of local culture. Nevertheless, land concentration and the diffusion of bookkeeping make data collection easy when dealing with corporate farms, while fragmentation and lack of accounting obstruct it when family farms are concerned.

Given these objective difficulties, the NBS focuses on large farms, and most data included in its databases are from farms sized over 10 ha. In order to compensate for this lack of information on a large sector of agriculture, the survey on *Agricultural Activity of Small Agricultural Producers in the Republic of Moldova* has been carried out quarterly on a sample of 2,332 farms with less than 10 ha of farmland since 2001. Aggregated data are presented in a yearly homonymous publication. The four questionnaires focus mostly on the production side of farming: neither data on family features, off-farm work and consumption, nor data on agricultural labour input are collected.

Another survey that, among the others, involves also farming families, and has been carried out monthly since 1997, is the *Household Budget Survey* (HBS). Quarterly and yearly samples of this survey are used for calculating social statistics, especially on poverty. The HBS includes questions on family characteristics, incomes and expenditures, both in the farming and in the off-farm sector. Since data on land ownership are also available, it is possible to select farm households and study them separately.

It seems that physical persons cannot be provided the primary databases of the *Survey on Small Producers* and the HBS. The NBS did not fulfil the requests of the author, delivered in person and in accordance with the requirements of this institution, and even through a local NGO. Thanks to the collaboration to a World Bank work on poverty assessment, the datasets of the Survey on *Small Producers* for the years 2012 and 2013, and those of the HBS for the period 2006-2013 were finally made available to the author in July 2015. Each dataset contains information on specific issues (e.g., the *Survey on Small Producers* reports used agricultural areas for each crop, while the HBS contains an extensive overview of family features and non-farm incomes). Unluckily, they cannot be merged, since the two samples do not coincide; therefore, the pragmatic choice of using only the HBS database is made.

In order to better understand the functioning of the Moldovan agricultural sector, the analysis of these quantitative databases should be supported by a direct knowledge of the situation on the field, and by qualitative data illustrating the opinions of small farmers and other key stakeholders. For this reason, the author carried out an extensive survey among Moldovan farmers in spring 2015. Initially, this survey aimed at creating a small database to be used if neither the Agricultural Census, nor the *Small Producers* survey, nor the HBS datasets were made available. Since such a situation did not display, data from the author's survey are used for drawing a picture of Moldovan family farms. Moreover, this survey includes questions on topics like farmers' motivations, potential investments, labour input for different agricultural tasks, and many others, which are not enquired by the HBS but are of fundamental importance for understanding the evolution of Moldovan family farms.

This chapter describes in details the available data, the difficulties in analysing them, and the methodology. The first paragraph focuses on the author's survey, whose questionnaire is available in the Appendix. The second paragraph describes the structure of the HBS. The third one illustrates how relevant variables are created, motivating the procedure. The fourth paragraph focuses on the methods used for analysing HBS data, which includes statistical tests on the difference of means, analysis of principal components, multiple OLS regression, propensity score matching for obtaining counterfactual incomes and life levels, multinomial logistic regressions, and probability transition matrices for time series data.

## 3.1.　Discovering the Field: An Original Survey from Spring 2015

A survey with small farmers, and five long qualitative interviews were carried out in the Republic of Moldova in spring 2015 by a two-people team including the author. Interviewers used a five-page questionnaire that included both quantitative and qualitative questions, while the five qualitative interviews followed a semi-structured outline.

The reference population for the survey are family farms as defined by the 2011 General Agricultural Census. Despite the focus of this study is on small family farms, the author interviewed also a few farmers cultivating more than 10 ha of land, in order to have an overall picture of the familiar agricultural sector. Indeed, an *a priori* exclusion of any category of farms would have born the risk of hiding key explanatory variables and patterns. An effective definition of small family farms needed, instead, to be elaborated endogenously, after observing the characteristics of the sample. As a result, within the survey sample the size of farmed land ranges from 0.04 to 38.50 ha. Interviewers did not define any *a priori* sample size, but rather a timeframe of three months (from April 6th to July 4th, 2015), with the aim of maximizing the total number of collected interviews. The final figure is 126.

The period of reference are the 12 months before the questionnaire. Questions on family composition, residence, labour, animals and animal production, incomes, entries, etc. had to be answered based on the situation during that period. However, it does not coincide with the agricultural year, which according to the 2011 Census definition goes from November 1st, to October 31st. Hence, questions on land ownership and use, crop cultivation, inputs, outputs, farm labour, mechanization services, etc. had to be answered with reference to the agricultural year from November 2013 to October 2014, especially in case remarkable changes had occurred in the following months, e.g. land purchase and sales, crop rotation, purchase or sale of agricultural equipment, etc.

All monetary values are expressed in the national currency, the Moldovan *Leu* (plural: *Lei*) (MDL) and in current 2015 prices. According to the National Bank of Moldova, the official average exchange rate from April 6th to July 4th, 2015 was 20.1433 MDL/EUR, which is much higher than in previous years.

Participation in the survey was voluntary: no farmer was paid. Interviewers used a "snowball" sampling method: respondents were asked to introduce other farmers from the village, and to recommend relatives and friends from other villages. Avoidance of institutional channels, and introduction by trusted people were key methodological tools. Indeed, farmers tend either to declare better life conditions than real ones in order to legitimize local authorities before international institutions, or because they are ashamed of their poverty, or to declare worse condition in hopes of getting some funding, or to avoid taxation. In order to gain the confidence of the respondents, interviewers started by reading them a statement that explained the aims of the research and guaranteed confidentiality of micro-data; moreover, interviewees were not asked their names. Personalized contacts and, at the same time, guarantee of anonymity are necessary in a country whose inhabitants, being externally ruled since centuries, have developed a strong feeling of mistrust toward institutional actors. In order to increase confidence of the respondents, interviewers used a printed version of the questionnaire, no electronic devices, and dressed simple, ordinary clothes.

The questionnaire was conceived so that it could be read to an adult member of the household (or to a married couple) in a face-to-face interview by the interviewing team. However, 13 questionnaires were filled in groups of two or more farmers assisted by the team; three by phone with the assistance of a relative of the interviewee; 11 by a second team of two people instructed by the author; and 12 were self-filled after receiving instructions (of which two in electronic format). The remaining 87 questionnaires were filled in individual face-to-face interviews carried

out personally by the author. For a large majority of interviews (121) the language was Romanian, while for the remaining five (taken in the minority-populated district of Găgăuzia) it was Russian. Since the intermediation of a translator was not necessary, interviewers could establish a closer contact with interviewees, observing the expression of their faces, and the tone of their voice in order to assess their sincerity. Some interviews were taken in public buildings (libraries, schools, town halls, State-owned shops and offices), made available to the team especially at this end; the remaining ones were taken in the house of the interviewees.

The first interview was taken on April 12th, the last on July 2nd, with a majority of them concentrated between mid-May and mid-June. The duration was between 30 and 60 minutes, depending on the economic size of the farm and on the desire of the interviewee to give additional information during the qualitative part. Interviewers controlled that the sample distribution of two stratifying variables (the farm size and the age of the household head) was similar to the population distribution revealed by the Census. When some specific age or farm size classes were overrepresented, farmers were asked to introduce people belonging to underrepresented groups. The final average farm size excluding farms with more than 10 ha of land is 1.07 ha in the Census population and 1.60 ha in the survey sample, while the average age of the household head is 53.1 years in the Census population[7] and 56.5 in the survey sample. Given the rapid ageing of the rural population, a difference of three years four years later (2011-2015) is not as large as it may appear at a first glance.

Given the complexity of the questions, and especially the need to recall economic data from the last 12 months, several farmers could not answer properly, or gave only rough estimates. However, this should be regarded as an ordinary situation, given the small number of family farms that keep accounting. Actual difficulties are even more evident if considering that some two people who assisted the team in finding potential interviewees had been members of the commissions that carried out the Census. Two of them declared that, given the refusal of several farmers to fill the Census form, they had to obtain all land data from the local land registry officer, and to guess all remaining information (owned animals, use of fertilizers, etc.). Finally, the complexity of the self-filled questionnaires used by the NBS requires a certain level of education, with the risk of an overrepresentation of better-educated and better-off families. In order to avoid such bias, the survey questionnaire did not include questions that implied a procedure of synthesis by the farmers (e.g. average values), the grammar was kept as basic as possible, and local expressions were preferred to standard Romanian. Hence, the team was able to reach families with different cultural and social backgrounds, even if at the price of a higher number of blanks.

As regards the territorial distribution, an absolute majority of interviews were taken in the districts of Orhei (60) and Telenești (25), followed by Briceni (11), Călărași (7), Găgăuzia (5), Chișinău, Florești and Sîngerei (3 each), while the remaining ones were scattered around the country. Overall, 19 farms are from the Northern Development Region, five from the South, three from Chișinău, and 102 from the Central Development Region. Several reasons explain the choice of concentrating most interviews in two central districts. The district of Orhei occupies a midway position between the capital and the periphery of the country. Therefore, neither closeness to Chișinău market, nor excessive isolation affect the conditions of its agricultural sector. In 2011, 39,451 family farms were operating in this district (the highest number in the country, after Găgăuzia), and their average size was 1.36 ha. Despite being classified as Central, Telenești district occupies a marginal position, and its area ranges between the fertile Răut River Valley and some remote areas, both covered by the survey. In 2011 there were 25,158 family farms, with an average size of 1.29 hectares. Briceni district, Găgăuzia and Chișinău present very specific conditions; therefore, including a number of farms from these areas improves the representativeness of the sample. Briceni is the northernmost district of the Republic of Moldova; here large export-oriented corporate farms tend to rent the land shares of families, thus resulting in a polarization of the agricultural sector; 31,176 family farms with an average size of

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[7] Since Census data are available only as aggregated data with age classes (NBS, http://www.statistica.md/public/files/publicatii_electronice/ Recensamint_agricol/RGA_2011_date_definitive.pdf, p. 328 [Accessed: 8th December 2015]), this value is calculated using the average class value and setting the limit of the upper class at 80 years.

0.99 ha operate here. Găgăuzia is a remote district situated in the South and has the status of Autonomous Territorial Unit (ATU) due to the presence of a Turkish-speaking minority; 40,761 farms with an average size of 0.95 ha operate here. Chișinău city-district includes several suburban villages and cities, which are affected by the spillover of the large market of the capital; in this district, there are 31,998 family farms with an average size of just 0.45 ha[8]. Another pragmatic reason for concentrating most interviews in only two districts is the lack of funding: interviewers had to rely on personal sources for moving from one village to the other. However, the use of public transports was an opportunity to experience directly the conditions under which family farms operate, and helped increasing empathy with them, since a large majority of rural families do not own any means of transport.

**Map 1. The Republic of Moldova: districts where the survey was carried out.**
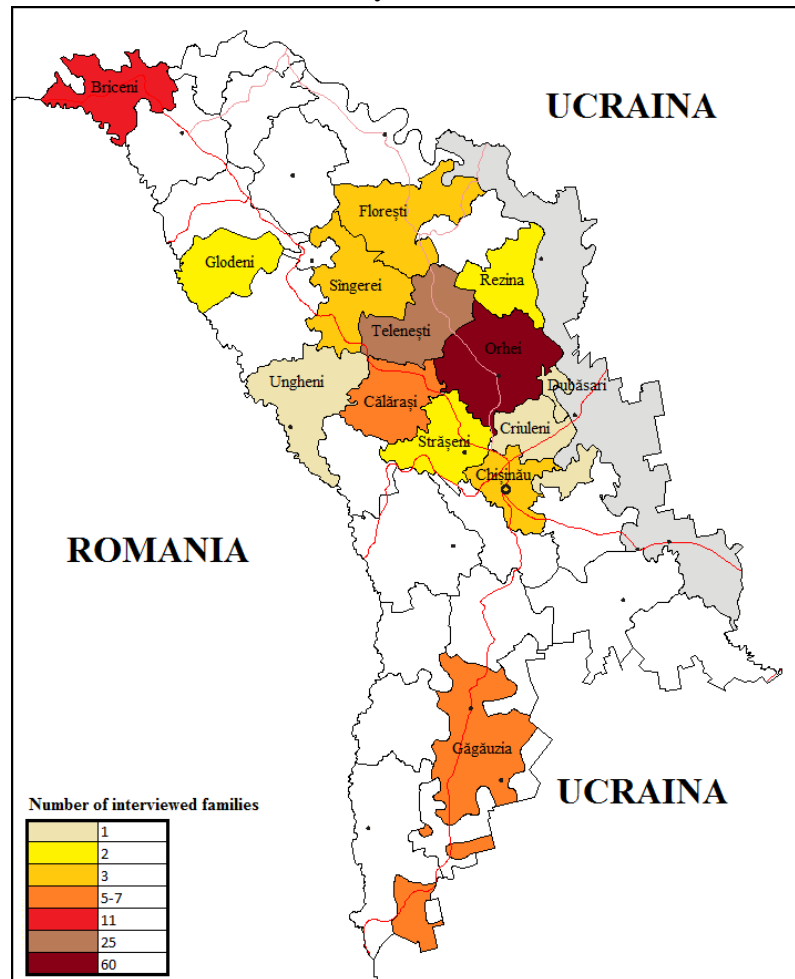


After pre-testing, the structure of the questionnaire was changed. The questions on family composition are asked first, in order to gain the confidence of the interviewee. A 31-item Likert scale used for assessing farmer motivations follows; farmers were usually allowed to speak as much as they wanted while filling this section, so that interviewers could get additional qualitative information on farm situation and evolution. The following section represents the core of the questionnaire. It alternates quantitative and qualitative questions on production input ownership and use, output consumption and commercialization, means of transports, interfamilial relations, taxes, etc. The final questions address issues such as remittances, loans, and potential investment plans, in order to leave the farmers with the feeling that a change for better is possible. As for expenditures, interviewers asked the total amount, or prices and quantities of purchased inputs. As for farm profit and other incomes, interviewers used different strategies: either asking for shares (e.g. the share of farm income over total family one), or asking for selling prices and sold quantities, but at different moments.

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[8] NBS, http://www.statistica.md/public/files/publicatii_electronice/Recensamint_agricol/RGA_ Vol_2.pdf [Accessed: 3rd October 2015].

Overall, the questionnaire contains eight complex tables on family composition, land, agricultural production, animals, animal products, agricultural labour, purchased inputs, and agricultural equipment, respectively. Then, it includes 19 closed-ended questions, four of which foresee the possibility for the farmer to further specify his chosen answer. The two questions on potential investments are conceived so that respondents are not provided the options, but rather left free to speak, while interviewers select the corresponding box and write down keywords. Five questions are open questions foreseeing a short answer (e.g. the agricultural wage in the village). Finally, there is the 31-item Likert scale aimed at verifying the main drivers of farmers' life choices. The items of the scale are statement regarding either family attitudes, abstract ideas, or collective perspectives. Some of them regard the same issue, but are formulated in the opposite direction, in order to check for coherence and prevent acquiescence bias. In the initial version of the questionnaire, each item had to be judged on seven levels (from "totally disagree" to "totally agree"), but after pre-testing, these were reduced to four, for two main reasons. First, farmers tended to simply tell whether they agreed or not, with more or less emphasis, so that seven options had the effect of confusing them; then, the odd number favoured a central tendency bias. Moreover, the language of the items resulted too difficult to understand, and was simplified from the grammatical and syntax point of view.

Out of 126 filled questionnaires, 13 show an elevated number of blanks; therefore, most of the Tables included in the following chapter do not take them into account. A simple random sample consisting of 126 units, extracted from a population of 898,768 family farms is equivalent to a confidence interval of ±9.22% at a confidence level of 95%, or of ±12.13% at a confidence level of 99%. However, due to stratification, the error margin is probably narrower. Table 1 below reports some synthetic indicators of the characteristics of the survey sample.

**Table 1. Main characteristics of the sample of the author's survey.**

| District of the farm (%) | Orhei: 51.3, Teleneşti: 17.7, Briceni: 9.7, Călăraşi: 5.3, Găgăuzia: 4.4, others: 11.6 |
|---|---|
| Age of household head (years) | min: 29, median: 58, mean: 56.9, max: 82 |
| Size of farms < 10 ha (ha) | min: 0.04, median: 1.01, mean: 1.61, max: 9.00 |

Source: Author's survey (Spring 2015).

Data from the questionnaire were processed in August 2015. The final output was an Excel file including 16 sheets: *Introduction*, *Family features*, *Motivations*, *Land*, *Agricultural products*, *Animals*, *Animal products*, *Transports and other issues*, *Labour*, *Entries*, *Machines*, *Taxes*, *Remittances and loans* and *Investments*. Every sheet includes a row per farm, while some of them include several rows per family (e.g., one for each vegetable product or agricultural machine). The latter are: *Agricultural products* (one row per product), *Animals* (one per animal), *Animal products* (one per product), *Labour* (one per task), *Entries* (one per input), *Machines* (one per machine), *Taxes* (one per tax), and *Remittances and loans* (two rows).

The final number of blanks is particularly elevated in some tables, especially *Agricultural products*, *Labour* and *Animal products*, given the difficulty in recalling complex data after a long period of time. However, interviewees tried to maximize the collected information by adopting some standard strategies. As for products cultivated in the vegetable garden, most families could not recall areas and quantities. Hence, they were asked, for every cultivation, whether the output had been enough for the entire year; if not provided, the area of land used for each vegetable was calculated by hypothesising that the garden area was divided in equal parts among listed vegetables.

Finally, apart from this survey, the team carried out six semi-structured interviews with important stakeholders of the Moldovan agricultural sector. Interviewed people are:

- A project manager of the Delegation of the European Union in Chişinău, responsible for monitoring rural and agricultural development policies;
- One member of a family that runs a farm with juridical status with a land size of 2,500 ha, situated in the district of Criuleni, close to Chişinău[9];

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[9] Based on Census data (NBS, http://www.statistica.md/public/files/publicatii_electronice/Recensamint_agricol/RGA_2011_date_definitive.pdf, p. 53 [Accessed: 8th December 2015]), farms with a surface over 1,000 ha are 271, i.e. 0.031% of the total number of farms operating in Moldova. Their average size is 1,894.41 ha, meaning that the interviewee's farms is at least in the top 0.018% by size.

- The accountant of the Economy and Credit Association "Victory", which grants short-term loans to small farmers in the village of Sărătenii Vechi, Telenești district;
- The land registry officers of the villages of Clișova and Pelivan, Orhei district;
- The vice-director of the Technical Agricultural College of Svetlîi, Găgăuzia, one of the eight agricultural colleges of the country and the only one situated in the South.

## 3.2. The NBS *Household Budget Survey* (HBS): Structure, Timeframe and Sampling Methods

The *Household Budget Survey* (HBS) has been conducted monthly by the NBS since February 1997. The aim of the survey is «to determine people's level of life through incomes, expenses, consumption, living conditions and other indicators from a multi-aspect perspective»[10]. Monthly data cannot be analysed separately: they are aimed at being grouped together in order to obtain representative samples on a quarterly or yearly basis. Data from 2006 to 2013 were made available to the author.

The sampling unit is the household, and the population of reference are citizens of the Republic of Moldova. Like in all other studies of the NBS, areas on the left bank of the Dniester River and the city-district of Bender are not included. All family members are registered by the questionnaire, including those who are absent for long periods (over one year), if they keep relations with their family. The registering person is the family head, or any adult member who knows the situation of the household. In order to cover the entire territory (big cities, small towns, and villages), the country is divided in Primary Sampling Units (PSU), and a number of households from each of them is selected. Hence, this is not a simple random sample: weights are included within the data in order to adjust the observations according to the size of their sampling unit. The sum of all yearly weights gives a figure, which corresponds roughly to the Moldovan population. Starting from 2008, a fifth of the PSU are replace every two years, so that data from before and after are not immediately comparable. Every month, the NBS selects 814 households, who must fill the *Main Household Questionnaire* and the *Household Register*. The former is filled with the help of an interviewer, while the latter is self-filled, since it implies that a family member should be ready to register all incomes and expenditures within a certain period. For most variables, the period of reference is the month of the interview. The occupation of family members is registered based on the situation in the last seven days; incomes from remittances and self-employment in agriculture refer to the month of the interview, or to the last twelve months (depending on the variable); data on expenditures, including self-consumption of the farm output, are registered for two weeks. Monetary values are in current MDL.

The average monthly number of families who completed the questionnaire in 2006-2013, and are thus included in the sample, is 470.4. The yearly sample size ranges from 6,133 in 2008 to 5,082 in 2013, totalling 45,160 units. However, many relevant variables regarding agriculture (e.g. farm income in kind and in money) were not detected in 2006, so that 5,746 sample units cannot be used in all analyses. According to the NBS, the two-stadium sampling scheme guarantees a standard error of ±31.90 MDL for personal income estimates for 2013, and ±30.20 MDL for the estimate of consumption expenditures per person in the same year at a confidence level of 95%.

Most households are interviewed repeatedly over time, according to a complex panel rotation scheme. Some of them take part in the survey four times, at a distance of twelve months each (i.e. in month $n$, $n+12$, $n+24$, and $n+36$); another group of farms are interviewed twice at a distance of four months (i.e. in months $n$ and $n+4$). The first of these two groups represents the panel sample proper, and a specific dummy identifies households belonging to it. In the eight-year sample of 45,160 units, panel households are 21,640, ranging from 3,012 in 2007 to 2,437 in 2013. Obviously, for most of them, less than four years are available, since they either entered the study before 2006 and exited it within a few years, or they entered the study after 2010. This timespan is not long enough for systematically studying phenomena like farm exit, also because, as explained in the fifth chapter, the number of these events is very small; however, it is possible to observe the changes of other important variables over time.

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[10] NBS, http://www.statistica.md/public/files/Metadate/CBGC.pdf [Accessed: 28th October 2015].

Survey data are processed every three months and yearly, and are organized in SPSS tables. Every household is identified by a univocal code and, apart from the sampling weight, also location and time variables are associated to each of them. The former are: the territory (i.e. the PSU), a dummy distinguishing urban and rural location, and a categorical variable identifying the development zone (North, South, Centre, and Chișinău). The latter include the year, the month, and the panel dummy. These are followed by a number of variables describing household features (family size, sex and age of the head, etc.). As a first step, the SPSS tables are merged using the univocal code and converted in Stata format. The result is a single Stata dataset including 45,160 units for 2006-2013, and around 400 variables. Incomes and expenditures are converted in 2010 constant prices. In that year, the official average exchange rate was 16.3995 MDL/EUR; monetary values are reported only in MDL.

As for the most recent year, more variables were included in the dataset. In particular, two tables – one including variables on farming, another with data on family members – were generated and then merged using Stata14. This dataset, together with the previous one, is used for conducting the quantitative analysis of Moldovan family farms.

The HBS does not focus specifically on farming households: as already pointed out, the population of reference are all Moldovan citizens. Hence, farming family must be detected through appropriate criteria. This is not a trivial task and it must take into account the research objectives: choosing a restrictive criterion bears the risk of excluding important sector of Moldovan agriculture. The number of families who engage in agriculture as their main activity is indeed limited (6.5% of weighted sample units), at least if it means getting more than half of total family income from farming. However, for a much bigger share of households, farming represents an important income source to overcome poverty, and working in the family farm plays a central role in everyday life. Based on these considerations, several alternative definitions of farm are elaborated, and corresponding dummies generated. An immediate criterion for detecting farming families is land. Out of 45,160 families, 36,328 own some land (72.1% using sample weights). However, many families who received land shares during the privatization process lease their land, or rent in land: as a result of these transactions, the number of farmers drops slightly to 36,288 (72.0%). The number of families who cultivate this land is even lower (35,256; 69.5%). Moreover, these families do not coincide with those who declared some farm income (in money or in kind). Since there are no data on this variable for 2006, the sample size becomes 39,414, of which 31,130 (70.4%) earn some farm income. On the one hand, 591 families earn farm income without cultivating any land, probably from animal breeding; on the other hand, 156 households cultivate some land without declaring any income: considering the small average size (0.04 ha) and their location, these are probably city gardens. At the ends of this dissertation, it is important to take into account potential farms (i.e. households who lease all land or have access to land but do not farm it), and households who earn farm income without farming any land. Therefore, depending on the subject under investigation, different delimitation criteria are used. However, for most of the analyses, family farms are defined as households that farm some land, regardless of land area and of family income shares, as explained in the previous chapter.

The 2013 database allows generating additional variables for describing the sector from different points of view. The HBS sample for 2013 includes 5,082 units. The number of landowners is 4,191; of these, 4,187 have access to land after rental transactions. The number of land users is 4,059, but only 3,909 declared some farm income (either in money or in kind). While 3,318 households own animals, only 3,155 list some animal products. Moreover, the number of households that declare at least one hour of work in the family farm is just 2,982. As for incomes, expenditures and the corresponding variables calculated using the 2013 dataset, prices are in current MDL; according to the National Bank of Moldova, in 2013 the official average exchange rate was 16.7241 MDL/EUR; monetary values will be reported only in MDL.

## 3.3.  Working on the HBS Database: Main Variables and Their Definition

This paragraph defines the main variables created using the HBS databases. While the NBS has already calculated some of them (e.g. family size, number of migrants, etc.), other need to be detected from the data. Moreover, since it is not possible to know in details the criteria for generating aggregate variables (e.g. monetary farm income),

alternative figures are calculated by the author whenever possible. HBS variables belong to four main categories: family features, farm characteristics, family incomes, and expenditures. The first three categories of variables are extensively used, while data on family expenditures are used limited to the share of food expenditures.

As for farm characteristics, the HBS database contains data on inputs, expenditures, and outputs. The first are: types of land, types of animals, agricultural equipment, and agricultural labour. Expenditures are grouped in several categories; however, it is not possible to know the quantities of purchased inputs (e.g. fertilizers, pesticides, etc.); therefore, total costs are considered a proxy of them, regardless of price variations. Farm outputs are grouped according to their use: either self-consumption, or sales. Subsistence products are registered for a period of a month, based on the *Household Register*, while as for marketed products, total yearly earnings are available.

Land variables are expressed in square meters; this unit of measure is maintained all over the analysis, apart from some cases (e.g. for avoiding generating coefficients which are too small). However, the Tables in the next chapters usually report values in hectares. Land types (house plots and small shares, big shares, rented-in land, dacha gardens, other land) are combined in order to obtain the land categories defined in the previous chapter. The share of leased land is calculated over owned land; those of abandoned, rented-in, and farmed land are calculated on available land. Unluckily, the land is not classified according to its use (either arable land, permanent crops, or pastures).

As for animals, the database reports the number of animals owned by every family during the interview; animal groups are cows, sheep, goats, pigs, poultry, and other animals (rabbits, horses, bee families, etc.). As for agricultural machines, the number owned by each family is not available, but only dummies for every machine type: tractors, ploughs, trucks, combines, seeders, carts, and processing equipment. The number of combines (3-7 households per year), seeders (16-42), and processing equipment (3-28) is very limited, while other machines are either used mostly outside the farm (means of transports), or in combination with a tractor (e.g., the plough). Therefore, the ownership of a tractor is used as a proxy of mechanization.

Calculating agricultural labour input is not a trivial task; indeed, this issue is not analysed in depth by the NBS. However, it deserves a careful investigation, since the development of the country, and the relief of families from poverty imply a transfer of the underemployed agricultural labour force to the off-farm sectors. The NBS classifies the heads of family farms as "self-employees", and other family members as "unpaid family workers"; for each of them, the number of hours worked in the week of the survey is reported. Due to seasonality, the number of worked hours depends on the month of the interview; however, since interviews are distributed along the entire year, sample figures can be considered representative at an aggregate level. Farm labour is calculated only for 2013 by summing the working hours of self-employees and unpaid family workers for whom the working sector is agriculture; this figure is then multiplied by the number of weeks in a year. Moreover, hired farm labour is calculated by dividing the expenditures for salaries by 150 MDL (the median daily wage according to the author's survey), and by multiplying the result by eight (the hours in a working day). The sum of these two figures represents total on-farm labour input.

In order to evaluate underemployment, total available family time is calculated using data from the Moldovan *Time Use Survey* (2011). For each family member, two key characteristics are considered: the age, and the sex. For every age class, the daily available time is calculated by subtracting from 24 the number of hours devoted to some tasks by people within this age class. These tasks are: sleeping, eating, dressing, washing, preparing food, washing dishes, going to school, doing the homework, feeding and taking care of the children. Differently from hobbies, these cannot be avoided, so that a person has no choice whether to use this time for different activities. The value of time devoted to each task is multiplied by the share of people who perform it, thus obtaining a better representation of the real situation. Since the *Survey* report does not provide any table with joint distributions (e.g. women aged 15-24, men aged 25-34, etc.), the aforementioned calculation is done for each age class, and for women and men separately. Then, the available time of each family member is calculated as a simple average of the available time for people of his age and for people of his sex. The total available family time is given by the sum of the available time of every single member. However, due to objective difficulties, this variable has a limited use.

Farm output can be detected from the value of marketed products and that of self-consumed farm products. As for the former, total yearly earnings by product are available; as for the latter, the dataset contains quantities for the last four weeks and prices for each product. Total farm output is calculated by summing up total monetary income from selling farm products, and twelve times the value of self-consumed farm output. However, this represents the monetary value of production, which gives an idea of potential farm income, but cannot be used for comparing production choices over territories, due to price variations. In order to obtain comparable figures, whose variation is influenced only by input use and combination, agricultural and food prices are harmonized all over the country, based on the hypothesis that products are sold at the same price declared for self-consumed ones. For every household $j$ selling $n$ products $i$, total production $Q_j$ is the sum of marketed quantity $q_{mj,i}$ and self-consumed quantity $q_{sj,i}$, evaluated at the median country price of product $i$, $p_{Mei}$. Following Tiberti (2012), median prices were chosen for reducing the impact of outliers. The formula is:

$$Q_j = \sum_{i=1}^{n} \left( \frac{q_{mj,i}}{p_{j,i}} p_{Me,i} + q_{sj,i} p_{Me,i} \right).$$

The same procedure is also applied, separately, to vegetal and animal products, in order to obtain variables to be used for calculating land and labour productivity. Instead, when calculating the share of self-produced food on total food expenditures of the family, non-harmonized values are used.

The HBS dataset reports monthly incomes at current prices (MDL); therefore, yearly incomes are calculated by multiplying these figures by 12. When performing longitudinal analyses, incomes are adjusted by consumer price indexes, obtaining constant 2010 prices[11]. Family incomes are then grouped into different categories: farm, waged, self-employment, property, welfare, pensions, remittances and other. For each category, both monetary and in kind incomes are included. All incomes, apart from farm incomes (and two cases of self-employment incomes for 2007), are positive. The number of negative farm incomes varies between 404 cases in 2007 and 655 in 2008. However, the NBS subtracts all farm exits from monetary farm income rather than, proportionally, from in-kind (subsistence) and in-money entries. Hence, when considering these two incomes separately, the latter is underestimated. In order to solve the issue of negative incomes, when calculating shares of marketed or self-consumed production, they are equated to zero. In-kind farm income is always zero or positive; therefore, in case of a negative monetary farm income, the share of subsistence is 100%, regardless whether the household sold some products. This issue does not materialize for 2013, since the database reports incomes from marketed products, and farm expenditures separately. Hence, farm entries for 2013 are calculated directly from agricultural products. Moreover, farm incomes calculated by the NBS include also other entries, like incomes from provision of mechanization services, which do not represent farm income proper, since the ownership of a tractor is independent from land ownership or use. As for non-farm incomes, they are grouped into earned (waged, self-employment, and remittances) and non-earned (property, welfare, and pensions).

Family characteristics are reported at aggregated level and for each member separately. The main ones are: the size of the household, the age of the household head (and its squared value), his sex, his level of education, and his health status, the number of migrants, workers, unemployed, underemployed, and disabled people in the household. An important variable used in the analysis is the "equivalent family size", which sums family member by assigning the value of one to the first adult, 0.7 to all additional adults, and 0.5 to children under 14 years. It has the function, among the others, to calculate family incomes per equivalent member at the ends of measuring poverty.

Apart from farm and family features, additional variables related to the external conditions, mainly location, are created. Indeed, Moldova includes five "development zones": the North, the Centre, the South, the ATU of Găgăuzia, and Chișinău. The first encompasses 11 districts and the city-district of Bălți; due to its more favourable climate, it has traditionally been the most developed agricultural area, with large farms and big extensions of fruit orchards. The Centre includes 13 districts; it is the most densely populated region apart from Chișinău, with comparatively

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[11] World Bank, http://data.worldbank.org/indicator/FP.CPI.TOTL [Accessed: 9th November 2015].

smaller farms, and a long tradition of growing vineyards; however, it includes also remote districts, like Șoldanești and Rezina. The South encompasses eight districts; it is a remote region even in comparison with the North, since there are no big cities; due to a dry climate, yields are lower, and the presence of steppes has favoured extensive sheep breeding. Găgăuzia is a small autonomous region located in the South and inhabited by a Turkish minority; its geographical features are analogous to those of the South, and in the HBS it is classified as South. Chișinău zone includes the homonymous city-district, surrounded by the Centre. As mentioned above, the HBS dataset includes a categorical variable for zones, which is used for creating four zone dummies. Regardless of their zone, Moldovan settlements are classified as either urban or rural; there are urban and rural settlements all districts. A municipality (lower administrative level) can include one or more settlements; urban municipalities can include also rural settlements. The HBS classifies the households based on the settlement where they reside. Usually, every district includes one urban settlement, where the main open-air market is located. However, 21 settlements with city status (classified as urban) are not district seats: six of them are located within Chișinău city-district and constitute its suburbs; 15 are often smaller than rural villages in their district, and were awarded the status of city for historical or political reasons.

Considering these features, neither the urban-rural divide, nor the pure clustering into development zones summarize at best the effects of location. For this reason, a classification of farms into central and peripheral, according to the distance of their PSU from Chișinău, is adopted. Based on the author's field experience, a threshold of 60 km is chosen, and a dummy is created. Important cities, like Orhei, Hîncești, Călărași and Ialoveni, linked to the capital, together with their districts, by frequent buses, are thus classified as central; villages belonging to the Centre although remote are categorized as periphery. The hypothesis is that farms located in the Centre benefit from the spill-over of Chișinău market, both as a destination for their products and as an opportunity of finding better off-farm jobs. Apart from the road distance from the capital, also the road distance from the second city (Bălți) and from the main town of the district were summarized within two quantitative continuous variables.

After setting the data for panel analysis, some specific variables indicating changes over time are created. These are: variation of owned land (either sale or purchase), variation of available and farmed land (either farm shrinkage or growth), farm entries and exits, and variation of farm income. They are equal to the gap between the present and the lagged values of order one. If the lagged value for owned land is nil, while the present value is positive, a farm entrance is registered; conversely, a farm exit is recorded. The HBS sample follows a rotating panel scheme; therefore, when the lagged value is missing, also the variation assumes a missing value.

This paragraph described how the main variables are calculated starting from the HBS database. Variables created for specific sections of the analysis are described in the respective paragraph. In particular, logarithmic variables are used for the production functions and for calculating productivity. Whenever a logarithmic variable is calculated, a unit is summed to the argument of the logarithm in order to avoid generating missing values.

## 3.4. Quantitative Methodology for Analysing the HBS

This paragraph shortly describes the methodological tools used for analysing the data of the author's questionnaire and the HBS. These include: 1) a principal components analysis for describing the drivers of farmers' choices; 2) the grouping of farm households in different categories, and the test of differences of means for key descriptive variables; 3) multinomial logistic regressions and logit regressions for detecting the determinants of production and livelihood choices; 4) OLS linear regressions of logarithmic values of key variables on other variables to estimate the production functions; 5) the calculation of Markov transition matrices and asymptotical switching probabilities for changes of key variables over time; 6) the calculation of counterfactual incomes and life levels with propensity score matching for the poverty analysis. The output of the author's survey is a Microsoft Excel dataset; the descriptive tables relating to these data are thus created using this program. Instead, the HBS datasets (overall and for 2013) are analysed using Stata 14 and Stata 11.

As mentioned above, the author's survey includes a 31-item Likert scale that aimed at detecting the main drivers of farmers' motivation. The dataset, which includes 31 variables (ranging 1 to 4) measured for 126 households, is

transferred in Stata 11 format and analysed using the `pca` command, which performs principal component analysis of the correlation matrix. Standard errors for the eigenvalues, the eigenvectors, and the cumulative percentage of explained variance are not computed. After estimation, the `rotate` command is used for verifying if a better result is available through rotation; since the explained variance and the loadings do not improve significantly, the un-rotated estimation is kept. In order to choose the number of component to retain, the eigenvalues are plotted using the command `screeplot`. However, no sudden change in the slope is observed; therefore, all components with eigenvalues over the unit are retained. The goodness of fit is then verified through `estat kmo`.

Together with the principal component analysis, a test of hypothesis on the mean answer to each item of the Likert scale is also implemented. Apart from one item which is specifically addressed to working-age people, the number of respondents is above 120 for each item, so that the distribution tends to a Normal regardless of the real one. The test statistic is $T = \frac{\bar{X} - \mu_0}{S/\sqrt{n}}$, where $\bar{X}$ is the sample mean, $S$ its standard deviation, $n$ its size, and $\mu_0$ the value of the mean under the null hypothesis, which corresponds to the average value of the scale (2.5). The alternative can be mono or bidirectional, depending on the specific item of the Likert scale; the corresponding p-values are reported in Table 5.

The analysis on the HBS datasets is carried out after having declared survey design through the Stata command `svyset`, assuming probability weights equal to those already available in the original dataset. As for the panel analysis, data are declared time-series data through the command `tsset`; the panel variable is the unique identity code, and the time variable the year (from 2006 to 2013). Households that did not participate in the panel are excluded.

The analysis of the HBS databases starts with a number of descriptive Tables of family farms grouped according to specific characteristics (farm size, level of market integration, and farm location). The land size is represented by a categorical variable that can assume three values: 1 for small farms, 2 for middle-size ones, and 3 for large ones. Market integration and farm location are dummy variables: the former turns 1 if the farm earns more than one tenth of its income in money; the latter turns 1 if the farm is situated at less than 60 km road distance from Chişinău. For each relevant variable regarding family features, economic conditions, or farm characteristics, the average value is calculated for all family farms in a specific year (2007, 2010, and 2013), and then for each group of farms, as defined by the abovementioned categorical variables, using the command `svy: mean`. Then, the difference of means across groups is tested using the F-test for regression, which is provided by the Stata command `svy: regress`. The F-test tests the hypothesis that all coefficients of the regression model apart from the constant (in this case, the coefficient of the dummy), are equal to zero. As for farm size, which can assume more than two values, the F-test is implemented after regressing each tabulated variable on three new dummies: one for each value (one of them is omitted for avoiding multicollinearity). The same method is implemented in order to test if the differences of average values across years is significant (year 2006 is omitted for avoiding multicollinearity). The F-test statistic is calculated as the ratio between explained and unexplained variance; the level at which the null hypothesis of equality of means can be rejected is reported in the Tables ($*** = 0.001$; $** = 0.01$; $* = 0.05$; $. = 0.1$). In Table 5A, which focuses on longitudinal changes, each variable is also regressed on a discrete time variable, which assumes the values of the years (2006-2013), in order to verify the presence of linear trends. The $R^2$ coefficient for the models, the slope of the regression line, and the p-value for the null hypothesis that the slope is equal to zero are reported in Table 5A.

The logistic regression is a generalization of the linear model where the dependent variable is categorical (binary). The function linking the dependent variable to the independent ones is the logit, i.e. the natural logarithm of the odd ratio between the probability for the binary variable to assume one value, and the probability to assume the alternative value. For the dummy $X$, turning 1 with probability $p$, and depending on a set of $n$ variables $Y$, the logistic equation is:

$$logit(p) = \beta_0 + \sum_{i=1}^{n} \beta_i Y_i = Y\beta, \text{ where } logit(p) = \ln\left(\frac{p}{p-1}\right), \text{ and } p = \Pr(X = 1)$$

The multinomial logistic regression generalizes the previous equation to the case when the dependent variable is still categorical, but it can assume more than two values. In this case, according to the assumption of independence

of irrelevant alternatives, the logit for each potential value of the dependent variable is calculated as the natural logarithm of the ratio between the probability that the dependent variable assumes that specific value, and the probability that it assumes an outcome chosen as a pivot (as for land variations, this outcome corresponds to no land variation).

The logistic and multinomial logistic regressions are calculated with Stata, using `logit` and `mlogit`, respectively; before running these regressions, data are declared to be survey data, so that sample weights are included. Overall, the results of four multinomial logistic regressions and two logistic regressions are reported in the following chapters. After calculating the coefficients for each dependent variable, the change in the odd ratios determined by a unitary variation of the dependent variables are calculated, limited to those variables that generated a significant coefficient. The estimated equations are:

1) Multinomial logistic regression for the variation of total farmland, where the dependent variable, $\Delta L_a$, turns 1 if
   $\Delta L_a = L_{a,t} - L_{a,t-1} > 0$, zero if $\Delta L_a = L_{a,t} - L_{a,t-1} = 0$, and $-1$ if $\Delta L_a = L_{a,t} - L_{a,t-1} < 0$, with $t \in [2007; 2013]$.

2) Multinomial logistic regression for the variation of farmed land, where the dependent variable, $\Delta L_f$, turns one if
   $\Delta L_f = L_{f,t} - L_{f,t-1} > 0$, zero if $\Delta L_f = L_{f,t} - L_{f,t-1} = 0$, and $-1$ if $\Delta L_f = L_{f,t} - L_{f,t-1} < 0$, with $t \in [2007; 2013]$.

3) Multinomial logistic regression for the variation of owned land, where the dependent variable, $\Delta L_o$, turns one if
   $\Delta L_o = L_{o,t} - L_{o,t-1} > 0$, zero if $\Delta L_o = L_{o,t} - L_{o,t-1} = 0$, and $-1$ if $\Delta L_o = L_{o,t} - L_{o,t-1} < 0$, with $t \in [2007; 2013]$.

4) Multinomial logistic regression for the self-assessed life level, where the dependent variable turns $-1$ if in 2013 the life level is assessed negatively (1-2), zero for a mid-level assessment (3), and one if it is assessed positively.

5) Logistic regression for the choice of farming one's own big share, where the dependent variable turns one if the family farmed at least a part of its big share in 2013, zero otherwise, and the sample is represented by recipients.

6) Logistic regression for the choice of hiring non-familial agricultural labour, where the dependent variable turns one if the farming family spent any positive sum of money for agricultural salaries in 2013, zero otherwise.

Linear regression with Ordinary Least Squares (OLS) is used, instead, for estimating the production function for both vegetal and animal output $Y$. Since several farmers did not declare any output, although they either farm some land, or grow some animals, only those who declared a positive vegetal or animal output, respectively, were included in the sample. The dependent variable is represented by the logarithm of the aggregate vegetal and animal production, respectively, harmonized at national level using median prices. The covariates are $n$ dummy and count variables $D$, summarizing location (urban or rural, and zone) and household characteristics (size, and head age), and $k$ logarithms of farm production inputs $X$ (either farmed land, labour, and variable inputs, or animals, labour, and feed). The regression line is: $\ln(Y_i) = \beta_0 + \sum_{j=1}^{n} \alpha_j D_{i,j} + \sum_{l=1}^{k} \beta_l \ln(X_{i,l}) + \varepsilon_i$. The regression coefficients $\hat{\alpha}$ and $\hat{\beta}$ are estimated using the `regress` command, after having declared survey design through `svyset`. Then, in order to verify whether the residuals $e_i = y_i - \hat{y}_i$ are homoscedastic, both the residuals themselves, and the predicted dependent variables $\hat{y}_i$ are calculated using `predict` and plotted using the command `plot`. No extreme outliers are observed; however, this procedure allowed detecting the family farms that did not declare any output, which were than excluded.

Markov transition matrices, or stochastic matrices, are squared matrices used to describe the transitions of a Markov chain, i.e. a memoryless stochastic process taking place in a discrete timespan. The variables of interest, which present a certain value at time $t$, can either remain in the same state at time $t+1$, or switch to another state that depends only on the state at time $t$, and not on previous ones: $\Pr(X_{t+1} = x | X_1 = x_1, \dots, X_t = x_t) = \Pr(X_{t+1} = x | X_t = x_t)$. The process is time-invariant, i.e. the probability of switching from a state to another does not change depending on time. In the long-term, this process converges toward an asymptotic, stationary distribution, which is independent from the initial one. If one of the states is a closed class (i.e. the probability of switching from that class to another is zero), all units converge toward that state. The output of a Markov transition process is a $n$-dimensional squared matrix, $n$ being the number of potential states, i.e. the values that the variable of interest can assume. Elements of the matrix are the estimated probabilities of switching from state $i$ (indicated in the rows) to state $j$ (indicated in the columns): $\hat{p}_{i,j} = n_{i,j} / \sum_j n_{i,j}$. Probabilities are standardized by row, so that the elements of every row sum up to one; the elements

of the main diagonal are probabilities of observing no switch from the corresponding status. The asymptotic distribution of the statistical units among states is obtained by self-multiplying the matrix a number of times which tends towards infinite. It is possible to verify whether the distribution at time t is independent from the distribution at time *t–1* by calculating the Pearson's Chi-squared test of independence. Overall, six transition processes are estimated, using the command `markov` from the homonymous Stata module created by Nicholas Cox in 1998:

1) Change of farmed land, where the variable of interest, $\Delta L_f$, can assume three values (states): one if $\Delta L_f = L_{f,t} - L_{f,t-1} > 0$; zero if $\Delta L_f = L_{f,t} - L_{f,t-1} = 0$; and –1 if $\Delta L_f = L_{f,t} - L_{f,t-1} < 0$; the output is a 3-dimensional matrix.

2) Change of available land, where the variable of interest, $\Delta L_a$, can assume three values (states): one if $\Delta L_a = L_{a,t} - L_{a,t-1} > 0$; zero if $\Delta L_a = L_{a,t} - L_{a,t-1} = 0$; and –1 if $\Delta L_a = L_{a,t} - L_{a,t-1} < 0$; the output is a 3-dimensional matrix.

3) Transition from agricultural profit to loss, and conversely, where the variable of interest, $I_{farm}$, can assume two values (states): one if $I_{farm} > 0$ (profit); and zero if $I_{farm} \leq 0$ (loss or parity); the output is a 2-dimensional matrix.

4) Intensification of farm production, where the variable of interest, $\Delta P_f$, can assume two values (states): one if $\Delta P_f = \frac{I_{farm,t}}{L_{f,t}} - \frac{I_{farm,t-1}}{L_{f,t-1}} > 0$ (intensification); zero if $\Delta P_f = \frac{I_{farm,t}}{L_{f,t}} - \frac{I_{farm,t-1}}{L_{f,t-1}} \leq 0$; the output is a 2-dimensional matrix.

5) Transition across different shares of farm income, where the variable of interest, $S_f = \frac{I_{farm}}{I_{tot}}$, can assume six values (states): 0 if $S_f = 0$; 1 if $0 < S_f \leq 0.1$; 2 if $0.1 < S_f \leq 0.25$; 3 if $0.25 < S_f \leq 0.5$; 4 if $0.5 < S_f \leq 0.75$; and 5 if $0.75 < S_f \leq 1$. In this transition, the sample includes also non-farming households; the output is a 6-dimensional matrix.

6) Transition across different levels of market integration (i.e. shares of monetary farms income), where the variable of interest, $S_m = I_{farm,m}/I_{farm}$ can assume five values (states): 0 if $S_m = 0$; 1 if $0 < S_f \leq 0.25$; 2 if $0.25 < S_f \leq 0.5$; 3 if $0.5 < S_f \leq 0.9$; and 4 if $0.9 < S_f \leq 1$; the output is a 5-dimensional matrix.

Before calculating the Markov transition matrices, data are declared to be time-series data through the command `tsset`. Instead, sample weights are not included in the calculation, as this does not bias or invalidate the results. The Pearson's Chi-squared test rejects the null hypothesis of independence between the distribution at time *t* and that at time *t–1* for all six transitions at the level of 0.001; however, it does not say anything about the type of association.

The last step of the analysis of the HBS dataset concerns poverty and life level implications of farming. Poverty headcounts indexes are calculated as the share of population living in families whose incomes (or expenditures) per equivalent member is below the poverty line (or the living minimum) in a specific year. First, a dummy turning one if the family is poor, zero otherwise, is created; then, the population living within these families is calculated using sample weights, with the Stata command `svy: total`. The poverty headcount is calculated as the ratio between this figure and the entire population (i.e. the sum of the products of family sizes *s* by sample weights $w$: $P_{tot} = \sum_{i=1}^{n} s_i w_i$). Inequality is calculated through the Gini index, using the `ginidesc` Stata command; statistical units are Moldovan families, the variable is the income per equivalent family member; sample weights are also included. The Gini index ranges from 0 (fairest distribution) to 1 (highest concentration), and the formula is $G = 1 - (\sum_{i=1}^{n} Q_i / \sum_{i=1}^{n} F_i)$, where $Q_i$ and $F_i$, calculated after ordering the households by growing income per equivalent members, are the cumulated share of income up to the *i*-th family, and the cumulated share of families up to the *i*-th family, respectively.

In order to evaluate the effect of farm income and other types of earnings on family income, poverty and inequality, and the effect of farming and other factor on the overall family wellbeing, following Möllers and Meyer (2014, p. 5), propensity score matching (PSM) is implemented. This methodology consists of three steps: first of all, a logit model is estimated, where the dependent variable is a dummy indicating whether the family receives the respective income, or presents the characteristic under analysis (i.e. a dummy for receiving the treatment); second, the odd ratios obtained through the logit regression are used for predicting the propensity score (i.e. the probability for a family to be assigned to the treated group); third, treated and untreated families are matched, and the actual incomes of matched untreated households becomes the counterfactual incomes of the treated ones. Therefore, the resulting counterfactual income of the overall sample is given by the actual income of untreated families, and the matched income of treated ones. The used Stata module is `psmatch2` (Leuven and Sianesi 2003). In order to perform the logit regression, the

command `logit` is run, using a number of family characteristics and location variables as covariates. Following the recommendations of the authors of the module, sampling weights are ignored when running the logit regression, and the matching is performed on the odd ratios; however, sample weights are used for calculating synthetic indexes on the counterfactual incomes and life levels, and the resulting poverty and inequality indicators. Due to the potential infinite number of covariates influencing the propensity score, the risks of selection bias, and omitted variable bias exist. Overall, nine logit models are estimated for assessing the effects of different types of incomes, and seven for assessing the effect of different factors on the self-assessed life level. The following logit equations are used:

1) $logit(p) = \beta_0 + \beta_1 age_i + \beta_2 sex_i + \beta_3 size_i + \beta_4 dU_i + \beta_5 dC_i + \beta_6 dN_i + \beta_7 dS_i;$

2) $logit(p) = \beta_0 + \beta_1 age_i + \beta_1 age_i^2 + \beta_2 sex_i + \beta_3 act_i + \beta_4 dU_i + \beta_5 dC_i + \beta_6 dN_i + \beta_7 dS_i;$

3) $logit(p) = \beta_0 + \beta_1 age_i + \beta_2 sex_i + \beta_1 inv_i + \beta_3 child_i + \beta_4 dU_i + \beta_5 dC_i + \beta_6 dN_i + \beta_7 dS_i;$

4) $logit(p) = \beta_0 + \beta_1 age_i + \beta_2 sex_i + \beta_3 act_i + \sum_{t=1}^{T} \alpha_{t,i} terr_{t,i};$

5) $logit(p) = \beta_0 + \beta_1 age_i + \beta_2 sex_i + \beta_3 act_i + \beta_4 dR_i + \sum_{t=1}^{T} \alpha_{t,i} terr_{t,i};$

6) $logit(p) = \beta_0 + \beta_1 age_i + \beta_2 sex_i + \beta_3 I_i + \sum_{j=1}^{6} \alpha_{j,i} D_{j,i}.$

Where, for each family $i$, $age_i$ is the age of the head (and $age_i^2$ its squared value); $sex_i$ the sex of the head; $size_i$ the family size; $act_i$ the number of active members over 18; $inv_i$ the number of invalid members; $child_i$ the number of children under 16; $dU_i$ a dummy turning 1 if the household is located in an urban area; $dC_i$, $dN_i$, and $dS_i$ dummies turning 1 if the household is located in the Centre, North, and South respectively; $terr_i$ are T dummies for the PSUs; $dR_i$ is a dummy turning 1 if the household receives remittances; $I_i$ is the family income in thousands MDL; and $D_i$ are six dummies, whose meaning is explained later. The independent variables used in the first equation are five dummies, indicating respectively if the family received remittances, farm income, pensions, or self-employment income. The second equation is used for calculating the propensity score for receiving wages; the third, for welfare income; the fourth, for farm and waged incomes; and the fifth, for farm income. The last equation is used for calculating the propensity score for obtaining counterfactual life levels. Seven dummies are generated, indicating respectively if the household owns land, grows poultry, owns a car, resides in Chișinău, or in urban areas in general, if at least a member migrated abroad, and if the head has a good health condition. Overall, seven equations are estimated, using one of the dummies as independent variable, and the remaining ones as covariates. The HBS dataset for 2013 is used.

After calculating the propensity score with `predict double`, treated households are matched with the `psmatch2` command. This implements Mahalanobis and other types of matching, calculating «approximate standard errors on the treatment effects assuming independent observations, fixed weights, homoscedasticity of the outcome variable within the treated and within the control groups and that the variance of the outcome does not depend on the propensity score»[12]. The single nearest-neighbour method is used for matching the pairs, with a maximum distance of controls (i.e. the caliper radius) set at 0.01 when incomes are concerned, and at 0.25 for self-assessed life levels (the latter in order to obtain only integer self-assessments). The goodness of the matching is verified by checking the reduction of the differences between the mean values of the covariates among treated and untreated observations, tested through a t-test using the `pstest` command. The post-treatment effect is the difference between the mean value of the output variable (either the family income per equivalent member, or the self-assessed life level, depending on the equation) between the treated observations and the matched untreated ones. According to the authors of the module (Leuven and Sianesi 2003), it is not clear whether the bootstrap is a valid instrument in this context; nevertheless, the homonymous command is used for obtaining fifty replicates of this figure through bootstrapping the estimate standard errors. The resulting mean values are reported in Tables 14A and 15A, alongside either synthetic indicators for counterfactual incomes, and the resulting poverty and equality measures, or indicators for counterfactual life levels.

Some of the methods described in this paragraph are applied in a Policy Research Working Paper, to which the author contributed together with Judith Möllers, Thomas Herzfeld, and Axel Wolz, and whose data are provided by the World Bank. These analyses were, then, extended by the author, and are presented within the fourth chapter.

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[12] RePEc, http://repec.org/bocode/p/psmatch2.html [Accessed: 9th December 2015].

# 4. Describing the Context: from the Agricultural Sector to the Farm Household

The present chapter aims at providing a picture of the typical Moldovan family farm, based on the information collected through the author's survey. This includes a description of the family itself, the environment where it operates, its resource endowment (land, animal, and labour), the use of these resources to obtain farm output, its incomes and financial resources, and actual or potential investments. This dense description is introduced by an analysis of the cultural, psychological and sociological factors driving farmers' living choices, which is also based on data collected through the survey. The entire analysis is inserted within the framework of the Moldovan farming sector as emerged from over twenty years of economic reforms.

## 4.1. Moldovan Agriculture: from USSR, through Land Privatization, towards European Integration

Although the territory under research is referred to as the Republic of Moldova *tout court*, the region east of the Dniester River and the city-district of Bender, both administrated by the self-proclaimed Pridnestrovian Moldovan Republic, are not analysed in this thesis. Even the NBS collects no data there. The focus is rather on the historical region of Bessarabia, delimited by two rivers: the Prut on West, which signs the border with Romania, and the Dniester on East, which separates it from Transnistria and from Ukraine. The present borders of the Republic of Moldova were drawn definitively only in 1947, after the peace treaty between the USSR and Romania. They encompassed a more sovietised territory that would later become the Pridnestrovian Moldovan Republic, and Bessarabia, which, in previous centuries, had belonged to the Turkish Empire, to czarist Russia, and was then exiting a twenty-year period of Romanian domination. The new Moldovan SSR remained part on the USSR until 1991, when it proclaimed its independence as the Republic of Moldova, losing the industrial areas of Transnistria. The NBS avoids reporting the surface of Bessarabia, probably for geopolitical reasons; however, an indirect estimate through other documents published by this institute is 30,355 km$^2$. This region is well suited for farming, and its structure of gentle hills, ranging from the sea level to 430 m, favoured the development of a dense village network.

In Soviet times, Moldova was perceived to have «a comparative advantage in agri-food products»; therefore, it «became an important net exporter of these goods within the USSR» (Gorton and White 2003, p. 307). As a result, in 1990 the agro-industrial complex produced 52% of the global social product (the Soviet equivalent of the GDP), employing 56.6% of the country's fixed capital and 56.9% of the active labour force (State Department of Statistics 1991). The following year, the share of agriculture and food production on the GDP was 43%. The agro-industrial complex was dominated by huge enterprises that, in 1990, included 534 *kolkhozes* (collective farms) and 400 *sovkhozes* (State farms); overall, this sector included 2,615 public enterprises. The average land size of the *sovkhozes* was 2,000 ha, while *kolkhozes* were usually larger (3,000 ha) and had more freedom in decision-making; moreover, the latter were owners of the means of production but not of land, since officially they were producer cooperatives. Apart from farming and transforming agricultural products, these organizations were responsible for the provision of social services in rural areas. Therefore, they were rather «multi-purpose rural infrastructure enterprises» (Gorton and White 2003, p. 310) and up to 30% of their labour force was employed in restaurants, shops, schools, libraries, kindergartens, restaurants, etc. Moreover, they tended not to register agricultural profits, in order to redistribute them locally or to use them for improving rural infrastructures; hence, they appeared less efficient than they really were. For these reasons, at the beginning of the 1990s, the support for dissolution of collective farms was lower than for land privatization. Before independence, the small household plots of the members of the *sovkhozes* and *kolkhozes*, and the garden plots allocated to urban workers represented the only form of private farming. In 1990, they cultivated 125.9 thousand hectares of land out of 1,733.1 (7.3%), up from 86.9 thousand hectares out of 1,588.2 (5.5%) in 1980. From 1986 to 1990, the value of vegetal output produced in these plots was 107% that of the previous five-year period, compare to 96% among collective farms. Moreover, households engaged in animal breeding. In 1990, they produced 23.3% of the total national production of meat, 18.5% of milk, 27.3% of eggs, and 59.0% of sheep wool. In 1986-1990, total animal output was 106% of 1980-1985, compared to 123% among public enterprises.

Land privatization was one of the first reforms to be discussed after Moldova became independent. In December 1991, the Parliament approved the Land code (Code No. 828 of 25.12.1991), and a few weeks later, the Law on the peasant farm (Law No. 841 of 03.01.1992). The first one provided for an equity-driven insider privatization of collective and State farms, while the second set a framework for members of collective farms who wanted to exit these organizations and start a private business. However, two additional provisions limited the effects of these reforms: a moratorium on land sales until 2001, and the prohibition to return the land to former owners, which distinguished the Moldovan reform process from, e.g., the Estonian one, thus avoiding the desertion of land by families who disappeared during Soviet times. House gardens, household plots and gardens of city dwellers were awarded based on articles 11 (82) and 39 of the Land code, representing the so-called "small share". Arable land and permanent crops (orchards and vineyards) belonging to collective farms were distributed based on article 12 of the Land code and article 2 of the Law for amending it, constituting the "big share".

Local land commissions were responsible for distributing the land. Land recipients were workers of *sovkhozes*, *kolkhozes* and other public farm enterprises, including pensioners, former employees transferred to other organizations, and people who had worked for these enterprises for a minimum number of years. Moreover, up to 50% of the land was aimed at being distributed to local workers of the off-farm sector, and to disabled and elderly people, if none of their family members was eligible for a land share. The date for evaluating the eligibility was January 1st, 1992; therefore, people who had not worked in Soviet time did not receive any land share. Total land endowment was established at the level of municipality, after subtracting up to 5% for constituting the so-called "local reserve fund", i.e. all land subordinated to local administrative units that can be used for agricultural or social needs (article 64 of the Land code). In addition, pastures and hayfields remained in the hands of local authorities. According to article 13, the city council decided the concrete location of the plots without consulting the owner; these could be split into three different types of land: arable land, orchards, and vineyards. Moreover, in case the goodness of soil had been calculated in the locality, the physical size of plots could be differentiated based on it.

The provisions of the Land code were not applied until 1998, when the parliament dominated by the Agrarian Democratic Party was dissolved, and a new liberal government elected. At that time, 91% of the corporate farms were not profitable, and their heads had started selling assets in order to repay their debts. In addition, the government was heavily indebted; therefore, they had to negotiate a structural adjustment package with the IMF, which «stated clearly that "under the memorandum agreed, Moldova must continue the privatization program in agriculture"» (Gorton and White 2003, p. 320). The parliament passed the National Land Program (NLP), which was then implemented with the support of the US Agency for International Development (USAID). The debts of collective farms were converted into tax credits, so that land recipients were not made liable for them; moreover, the transfer of farm assets to creditors was forbidden. Nine hundred eighty-nine collective enterprises (96%) were dissolved, distributing 1.53 million hectares of farmland out of 2.55 million. More than one million beneficiaries were identified, who received 1.4 hectares on average. However, «while these formal stages [of the process] were adherent to in most instances, there were numerous cases of it turning into a "grab what you can" at local level, with buildings stripped of all that was of value» (Gorton and White 2003, p. 321). Moreover, the NLP did not take into consideration the role of collective farms as providers of social services and managers of rural infrastructures. Gorton and White (2003, p. 321) write that «much agricultural infrastructure (irrigation systems, orchards, and vineyards) has been lost completely or fell into disrepair as management was placed in the hands of tens of new owners without effective arrangements for their management». According to data reported by the NBS, in 2015, only 213.3 thousand hectares of arable land (11.7%), and 13.3 thousand hectares of permanent crops (4.6%) are irrigated; these figures have not changed since 2011. Due to the same faults of the NLP, peasant farms have big difficulties in procuring agricultural inputs (mechanization services, seeds, fuel, etc.), or in accessing credit.

The NLP increased private owned land from practically nil in 1990 to 67% in 2003, which grows to around 80% if considering all land farmed by private producers. Already in 2001, over 500 thousand individuals entitled to land had received their shares, and more than 200 thousand had registered their household as a peasant farm, the average

land size being 1.8 ha. The designers of the reform imagined that the land market would have helped overcoming the issue of land fragmentation in the following years. Instead, this institution developed quite slowly. Real estate was not included in the land registry before 1999, which may thus be considered as the starting year. The yearly number of transactions grew from nil in 1999, to more than 70,000 in 2008. However, most of the overall of around 400,000 transactions took place in the central districts. The situation appears much more static if considering the involved amount of land: only 38,000 hectares (1.7% of total agricultural land) changed owner during this decade, the average land transaction accounting for just 0.1 ha (Cimpoieș 2010).

Table 2 presents an overview of the Moldovan agricultural sector from the year before independence to 2013. The share of agriculture (including hunting, forestry, fish farming and fishing) on GDP decreased over years. The figures for the first half of the 1990s are not available; however, as mentioned above, this percentage was 43% in 1991. It was already much lower in 1995 (29.3%), and kept dropping, reaching a minimum in 2009 (8.5%). After having recovered a little in the following years, the 2012 draught interrupted the upward trend, so that it stopped at 12.3% in 2013. Draughts happen cyclically in Moldova, and due to the lack of irrigation facilities, they have dramatic effects: fluctuations in agricultural production and, hence, in the corresponding share of GDP (2003, 2007, and 2009) are due to these events. In this twenty-year period, the composition of agricultural production changed considerably. First, the total output of corporate farms kept decreasing each year until 2000, when it was worth less than one fifth its 1990 value. It recovered slightly in the following decade, but since many of these farms are specialized in extensive cultivation of cereals and oil seeds, the recurring draughts prevented a constant increase. Second, family farms show a clear upward trend, although their production less than doubled in the period considered. The best result was achieved in 2005-2006, but in 2013, they produced just 1.7 times the value of 1990, although they were much more and used a much larger amount of land. Indeed, the increase in total output expected by the advocates of land privatization did not take place.

**Table 2. Indexes of agricultural production, contribution of agriculture to GDP (%), and agricultural employment by year (1995-2013).**

| Group of producers, other indicators | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All agricultural producers | 157.2 | 141.5 | 118.8 | 130.7 | 98.0 | 100.0 | 88.0 | 97.7 | 86.0 | 79.1 | 76.7 | 81.3 |
| Corporate farms | 219.0 | 188.3 | 148.8 | 144.3 | 101.0 | 100.0 | 77.0 | 86.2 | 61.2 | 41.6 | 40.0 | 44.8 |
| Family farms | 74.6 | 79.8 | 81.4 | 112.3 | 94.3 | 100.0 | 101.0 | 112.1 | 117.7 | 126.0 | 122.2 | 127.1 |
| Agriculture, hunting and fishing on GDP | - | - | - | - | - | 29.3 | 27.5 | 26.0 | 25.8 | 24.9 | 25.4 | 22.4 |
| Agricultural employment (%) | - | - | - | - | - | - | - | - | - | - | 50.9 | 51.0 |
| **Group of producers, other indicators** | **2002** | **2003** | **2004** | **2005** | **2006** | **2007** | **2008** | **2009** | **2010** | **2011** | **2012** | **2013** |
| All agricultural producers | 83.8 | 72.0 | 87.2 | 88.0 | 87.1 | 67.1 | 88.6 | 79.7 | 86.1 | 90.4 | 70.5 | 98.0 |
| Corporate farms | 47.0 | 34.8 | 54.3 | 51.0 | 49.0 | 37.7 | 63.0 | 48.5 | 54.8 | 58.1 | 45.9 | 81.2 |
| Family farms | 130.9 | 120.4 | 131.2 | 136.5 | 136.5 | 105.1 | 124.0 | 121.5 | 127.6 | 134.0 | 108.5 | 129.2 |
| Agriculture, hunting and fishing on GDP | 21.0 | 18.3 | 17.6 | 16.4 | 14.5 | 10.0 | 8.8 | 8.5 | 12.0 | 12.3 | 11.2 | 12.3 |
| Agricultural employment (%) | 49.6 | 43.0 | 40.5 | 40.7 | 33.6 | 32.8 | 31.1 | 28.2 | 27.5 | 27.5 | 26.4 | 28.8 |

Source: Author's elaborations on data from the National Bureau of Statistics. Indexes with base year 1995 (= 100).

The share of the labour force employed in agriculture (including hunting, forestry, fish farming and fishing) is larger than the share of these economic activities on the GDP, meaning that the average income is lower than in the off-farm sector. However, given that several land recipients did not register their household as a peasant farm, and many pensioners work in farming, the real number of agricultural employees is larger. The prevalence of informal agricultural labour can also explain why the share of active population is extremely low (in addition, it declined from a maximum of 59.9% in 2000 to 41.2% in 2014). Although official figures for the 1990s are not available, formal agricultural employment increased after the NLP, peaking 51.0% in 2001; however, it declined sharply during the following decade, reaching 27.5% in 2011; instead, a slight increase occurred in the last years, up to 30.5% in 2014. The gap between urban and rural areas is very important. In 2001, agricultural employment was 8.8% and 77.3% respectively, while in 2014 it was 3.1% and 53.3%. It means that in rural areas the agricultural and food sector employs more than half of the formal workers. Since 57.8% of the population was still living in rural areas in 2014 (it stood at 59.1% from 2001 to 2006), the role of agriculture for the development of the country emerges clearly.

The collapse of the USSR and the transition of Moldova to market economy implied also a redirection of trade flows. Coherently with its specialization in the USSR, also the export of independent Moldova has been dominated by agricultural and food products. However, while the total export of the country increase by four times from 2000 to 2014, the share of agriculture and food decreased from 63.1% to 45.5%. At the same time, a reversal of positions took place between the Russia-dominated Community of Independent States (CIS) and the European Union (EU). Moldova was the last post-Soviet Republic apart from Georgia to join the CIS: the parliament ratified the treaty only in 1994, after the election of the PDAM. Since then, trade relations with Russia have been dominating. Indeed, thanks to the Soviet legacy, «"Moldova" is a well-known brand in the CIS countries, especially for wines, spirits and fresh produce» (FAO 2012, p. 38). The CIS does not hold large political powers, but it promotes cooperation among its members in various fields, and several trade agreements were signed within its framework. However, the share of Moldovan exports directed to this region decreased from 60.9% in 2000, to 31.4% in 2014. During the same period, the EU share grew from 32.3% to 53.3%. These flows are qualitatively different: agricultural and food products dominate those leading East (they accounted for more than 80.0% until 2005), while they are secondary in relation with the EU. However, since 2014, Brussels has overcome Moscow also as the main destination of Moldovan agricultural and food products. The main downturn in the relations between Moldova and Russia dates back to 2006, when the latter banned Moldovan wines due to political contrasts. The share of agricultural and food exports dropped by ten points (almost twenty if only the CSI is concerned): from being the first wine supplier of the Russian market, Moldova became the 23rd. This ban lasted until 2011, and was renovated in September 2013.

**Table 3. External trade of Moldova by groups of countries; shares of agricultural and food trade and commodities (2001-2014).**

| Groups of countries and indicators | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **All countries** Total export (1,000 USD) | 565 | 644 | 790 | 985 | 1,091 | 1,050 | 1,340 | 1,591 | 1,283 | 1,541 | 2,217 | 2,162 | 2,428 | 2,340 |
| Agricultural and food (%) (a) | 63.1 | 63.0 | 58.6 | 53.5 | 53.4 | 44.1 | 37.8 | 37.4 | 47.1 | 47.5 | 41.4 | 40.7 | 41.8 | 45.5 |
| Cereals and oil seeds (%) (a) | 9.0 | 10.4 | 4.3 | 5.3 | 5.9 | 6.2 | 4.8 | 7.4 | 10.3 | 10.5 | 11.4 | 6.3 | 11.8 | 14.3 |
| Beverages, spirits, vinegar (%) (a) | 30.9 | 30.4 | 30.6 | 28.2 | 28.8 | 17.8 | 10.0 | 12.3 | 12.4 | 11.6 | 8.2 | 9.9 | 10.4 | 8.3 |
| Total import (1,000 USD) | 892 | 1,038 | 1,402 | 1,769 | 2,292 | 2,693 | 3,690 | 4,899 | 3,278 | 3,855 | 5,191 | 5,213 | 5,492 | 5,317 |
| **CSI** Total export (1,000 USD) | 344 | 350 | 424 | 502 | 551 | 424 | 549 | 623 | 490 | 624 | 919 | 928 | 923 | 736 |
| - On exports (%) (b) | 60.9 | 54.4 | 53.6 | 51.0 | 50.5 | 40.3 | 41.0 | 39.2 | 38.2 | 40.5 | 41.5 | 42.9 | 38.0 | 31.4 |
| Agricultural and food (%) (a) | 80.2 | 81.4 | 80.9 | 79.5 | 76.6 | 58.2 | 49.7 | 52.9 | 67.3 | 63.2 | 46.7 | 43.8 | 43.0 | 50.0 |
| - On agricultural and food (%) (b) | 77.4 | 70.3 | 74.0 | 75.8 | 72.5 | 53.3 | 53.9 | 55.4 | 54.5 | 53.9 | 46.8 | 46.3 | 39.0 | 34.5 |
| Cereals and oil seeds (%) (a) | 7.3 | 6.8 | 3.0 | 4.1 | 3.2 | 4.2 | 4.0 | 4.6 | 4.5 | 3.7 | 5.8 | 3.6 | 4.5 | 6.9 |
| Beverages, spirits, vinegar (%) (a) | 49.2 | 54.0 | 55.2 | 53.6 | 54.8 | 34.5 | 20.2 | 26.7 | 26.1 | 23.2 | 15.2 | 17.4 | 17.8 | 14.7 |
| Total import (1,000 USD) | 340 | 409 | 593 | 765 | 905 | 1,021 | 1,334 | 1,737 | 1,142 | 1,257 | 1,713 | 1,624 | 1,672 | 1,449 |
| **EU** Total export (1,000 USD) | 182 | 231 | 307 | 401 | 443 | 537 | 679 | 820 | 667 | 729 | 1,083 | 1,013 | 1,137 | 1,246 |
| - On exports (%) (b) | 32.3 | 35.9 | 38.9 | 40.7 | 40.6 | 51.1 | 50.7 | 51.5 | 52.0 | 47.3 | 48.9 | 46.9 | 46.8 | 53.3 |
| Agricultural and food (%) (a) | 34.2 | 37.2 | 31.9 | 24.7 | 27.2 | 31.3 | 26.5 | 22.9 | 29.7 | 29.9 | 35.3 | 33.5 | 33.4 | 35.4 |
| - On agricultural and food (%) (b) | 17.5 | 21.2 | 21.2 | 18.8 | 20.7 | 36.3 | 35.5 | 31.5 | 32.7 | 29.8 | 41.7 | 38.6 | 37.4 | 41.4 |
| Cereals and oil seeds (%) (a) | 8.4 | 9.9 | 4.0 | 4.9 | 6.5 | 5.0 | 3.1 | 5.8 | 10.2 | 10.5 | 14.3 | 6.4 | 9.7 | 11.4 |
| Beverages, spirits, vinegar (%) (a) | 2.5 | 2.4 | 2.3 | 1.8 | 2.4 | 7.0 | 3.0 | 3.1 | 3.7 | 3.0 | 2.4 | 2.5 | 2.9 | 2.9 |
| Total import (1,000 USD) | 431 | 468 | 633 | 775 | 1,039 | 1,219 | 1,681 | 2,105 | 1,421 | 1,704 | 2,256 | 2,319 | 2,472 | 2,568 |

Source: Author's elaboration of data from the National Bureau of Statistics. Monetary values in constant USD (1,000); (a) Share on total export to the corresponding group of countries (%); (b) Share on export to all countries (%)

Since the second half of the 1990s, Moldovan governments have been particularly engaged in negotiating the liberalization of trade with the EU. From 1999 to 2006, Chișinău benefited from the so-called System of Generalized Preferences (SGP). This was then replaced by a potentiated version (SGP+), which stayed in force from 2006 to 2008, and according to which almost 90% of Moldovan products were duty-free; however, wines, spirits, sugar, meat, meat preparations, fruits, and vegetables were not included. In 2008, the EU Council of Ministers approved the so-called Autonomous Commercial Preferences, an asymmetric trade regime that foresees duty exemptions for all goods produced in Moldova, but excludes most of the agricultural and food products. Walnut kernel, sunflower seeds, and rough cow skin represented three exceptions; indeed, in 2008, they accounted for 60-70% of Moldovan agricultural exports to the EU (Piras 2012, p. 65). In 2011, tariff-rate quotas for wine, barley, wheat and maize were increased. Finally, in June 2014, Moldova and the EU signed an Association Agreement, that includes also a Deep

and Comprehensive Free Trade Agreement (DCFTA), whose sections apply mostly provisionally from September 2014. Twenty-three out of 25 chapters of the DCFTA had already been negotiated in 2012, but agricultural goods remained a divisive issue, as Moldova had the key interest of achieving complete access to the EU market for these products. Hence, among other provisions, the DCFTA foresees EU assistance in trade-related reforms, especially those aimed at improving food quality and safety. Although family farms produce for self-consumption or for local markets rather than for export, these treaties do have an impact on them, as described in the following paragraphs.

The search for closer ties with the EU has determined political contrasts with Russia, which banned once again Moldovan wines and agricultural products, especially fruits. Due to the lack of demand, agricultural prices dropped, and many large farmers did not collect fruits, which resulted in a loss of both rural profits and jobs. According to a large farmer from Criuleni district interviewed by the author, the farm-gate price of apples dropped from six to 1.2 MDL, and that of plums from five to 1.5 MDL. Apart from trade restrictions, EU consumers seem not to appreciate the sorts cultivated in Moldova. Romania offered to absorb part of this surplus, but storage facilities are needed in order to introduce it gradually on the market. This situation had the additional effect to incite Moldovan producers to look for alternative markets (e.g. Bangladesh) instead of relying on the Soviet legacy, but transport costs are high.

The main national institution responsible for the agricultural and food sector is the Ministry of Agriculture and Food Industry (MAFI). In the framework of the National Development Strategy *Moldova 2020. Seven solutions for Economic Growth and Poverty Reduction*, the MAFI adopted the *Strategic Priorities in the Years 2011-2015*, which connect «the development of agricultural policy with the broader policy of European integration and sets out the need for changes to Moldova agriculture to remain competitive on both domestic and European markets» (FAO 2012, p. 24). It includes eight measures, among which the promotion of food safety standards, the restructuring of the wine sector, the development of a modern market infrastructure, and the reorganization of the agricultural sub-sidy system. The Agency for Interventions and Payments in Agriculture (AIPA), established in 2010 with the support of the US Agency for International Development and the World Bank, is responsible for manging the subsi-dies to agriculture. It aggregates several functions previously provided by different institutions, working through a central body and nine decentralized offices. Agricultural extension services are provided by the National Agency for Rural Development (ACSA), a non-governmental organization that manages «a network of information, con-sultancy and training service providers for agricultural producers and rural entrepreneurs» (FAO 2012, p. 30), and reaches around 60% of the rural population. Other associations of non-government organizations and producers carry out similar functions. Moreover, in March 2015, the EU and Moldova signed a country-specific agreement in the framework of the European Neighbourhood Program for Agriculture and Rural Development (ENPARD), which allocates 64 million EUR for modernizing the agricultural and food sector. The EU is the major international donor for Moldova. However, a number of other international aid agencies are involved in the agricultural sector of the country: FAO, the World Bank, USAID, the US-based Millennium Challenge Corporation, and IFAD. Among national institutes, there is the Japan International Cooperation Agency (JICA), from whose funds a survey respond-ent could benefit, and equivalent institutes from Sweden, Poland, etc. Finally, Romania supports Moldova because of cultural reasons; e.g., AIPA was developed drawing from the experience of its Romanian counterpart. All these actors have a common approach to the farming sector, which aims at increasing its competitiveness and productivity in order to stimulate market-oriented agriculture.

Most family farms created by the NLP are too small for producing a consistent marketable surplus. According to a project development manager of the EU delegation interviewed by the author, when food safety, phytosanitary and traceability regulations are in place, semi-subsistence farms will face a choice: either withdrawing to pure sub-sistence, or becoming commercial. Indeed, consistent resources are required in order to implement these standards, and the EU does not have a specific program for assisting very small farms at this regard. Therefore, most of them will simply disappear within some decades. For this reason, diversification of rural economy needs to be achieved, so that agriculture may become a side activity for most rural families. Moreover, the Moldovan subsidy scheme is based on the "first-come, first-served" principle, while the EU favours pre-investment selection based on a business

plan. Many farmers lack the necessary knowledge for addressing such challenge. The opinion of the government is that large companies can easily overcome these difficulties by themselves, so that there is no need for specific assistance; small farmers can associate in producer groups if they want to present an application. Finally, every region of the country has different priorities: in the North, the youth need to be retained in agriculture in order not to lose the local large productive potential; in the South, basic rural infrastructure, such as streets, are still lacking.

**Table 4. Agricultural land by form of ownership at January 1st, 2015.**

| Type of land use | All property forms | | | Public | | Private | | |
|---|---|---|---|---|---|---|---|---|
| | 1,000 ha | % | (a) | 1,000 ha | % | 1,000 ha | % | (b) |
| Total agricultural land | **2,499.7** | **100.0** | **0.1** | **649.5** | **100.0** | **1,850.2** | **100.0** | **74.0** |
| 1) arable land | 1,817.4 | 72.7 | 0.3 | 264.5 | 40.7 | 1,552.9 | 83.9 | 85.4 |
| 2) perennial plantations | 291.7 | 11.7 | -2.4 | 37.3 | 5.7 | 254.4 | 13.8 | 87.2 |
| - orchards | 134.5 | 5.4 | 0.9 | 21.8 | 3.4 | 112.7 | 7.3 | 83.8 |
| - vineyards | 137.5 | 5.5 | -8.1 | 8 | 1.2 | 129.5 | 7.0 | 94.2 |
| 3) pastures | 346.4 | 13.8 | -1.1 | 341.5 | 52.6 | 4.9 | 0.3 | 1.4 |
| 4) hayfields | 2.2 | 0.1 | 0.0 | 1.7 | 0.3 | 0.5 | 0.0 | 22.7 |
| 5) fallow lands | 42.0 | 1.7 | 22.8 | 4.5 | 0.7 | 37.5 | 2.0 | 89.3 |

Source: Author's elaboration on data from the National Bureau of Statistics. (a) Variation from 2011 to 2015 (%); (b) Share of private land for each type of land (%).

The previous pages focused on the evolution of the Moldovan agricultural sector in the last two and half decades. The 2011 Agricultural Census, used as a reference point for many topics covered by this dissertation, drew a deep and comprehensive picture of it for the first time after independence. It numbered 898,768 family farms (regardless of registration), with an overall of 970,874 hectares of farmland; of these, 848,637 (94.4%) were active (they were farming some land, or breeding some animals). At the beginning of that year, Bessarabia had 3,560,430 inhabitants, 57.6% of whom lived in rural areas. This figure was only slightly lower in 2015 (3,555,159), so that the population density was 117 people/km$^2$, which is the highest among all post-Soviet countries and all post-communist countries of Central and Eastern Europe, apart from Poland, Czech Republic, and the disputed region of Kosovo. In bordering Romania and Ukraine, population density is much lower. At the same time, agricultural land represents 73.9% of the total area of the country, and 74.0% of it is in private hands. It is not clear how the NBS knows the use of land in Transnistria; however, given the industrial orientation of this area, the share of agricultural land in Bessarabia should be even larger. In conclusion, Moldova is a densely populated, resource-poor, land-rich country with an active family farm every 4.2 inhabitants. This figure explains efficaciously why, in front of a complex and all-encompassing agricultural sector, this phenomenon is worth being studied. This will be done in the following pages using survey data.

## 4.2. Drivers of Peasant Motivation: A Teleology of Family Farms

An old lady with a walking stick is sitting in front of the interviewing team.
Interviewer: «Now we speak about the tasks you have performed in the last twelve months».
Old lady: «Lad, can't you see my conditions? How do you think I can perform any work?»
Interviewer: «Ok. Hence, I suppose someone is helping you farming your land…»
Old lady: «Oh, lad, are you joking? No one wants to help, there is no one left in the village».
Interviewer: «Ok. It means you are leaving your land fallow. Why didn't you mention it?»
Old lady: «Oh, what a shame! Do I look so shameless? I do not leave a square metre fallow!»
Interviewer: «If you don't really want to answer seriously, why did you come? I would like to show to foreign observers that farmers are worth being funded, but you prove that it isn't».
Old lady: «Oh, lad, can't you see my conditions? Isn't it enough to prove we need funds?»
Interviewer: «Unfortunately for you, we are not in the USSR any more. You will get money only if you have innovative ideas, if you prove you are able to make more money with it!»
Old lady: «Really? Strange. Why helping people who already have everything they need?»

In order to identify the drivers of Moldovan farmers' production and consumption decisions, it is necessary to know the values that inform their life and the social environment. Although, at the end of the 1980s, the local nationalist movement encouraged the recovery of Moldovan traditions, rooted in rural areas, the post-communist transition

implied the pursuing of modernization, the diffusion of self-expression values, and a "revolution" of growing aspirations. This caused growing urbanization and a switch of labour from agriculture to other sectors (mostly services, since the country lacks an industrial base). Nevertheless, most of the families who received land shares according to the Land code keep farming at least a part of their land, even if some members found a better-paid job in the off-farm sector. Based on the declarations of some respondents, it is not uncommon to cover agricultural expenditures (that would be unbearable for a full-time farmer, since they often overcome monetary entries) with the money earnt in other economic sectors. This shows that Moldovan households engage in agriculture not for increasing their total income, but because of different motivations. Farming seems to be a life choice that bears a positive value in itself.

Survey respondents confirmed that no viable market of agricultural labour exists in Moldovan villages, at least for family farms. This situation is fostered by isolation, lack of transport means, lack of information, and depopulation. Elements of drudgery and risk aversion were also observed among respondents. At the same time, sharecropping is virtually absent due to the widespread distribution of land shares, and most families are not really engaging in market activities, so that their farms cannot be treated as profit-maximizing business. Hence, the way Moldovan family farms operate is probably consistent with one the three theories of the drudgery-adverse, risk-adverse and farm household peasant articulated by Ellis (1993), or with a combination of them.

**Table 5. Hypothesis tests for mean evaluation of Likert scale statements by farmers.**

| Statements | (a) | (b) | $H_0$ | $H_1$ | t | p-value | Decision (0.05) |
|---|---|---|---|---|---|---|---|
| 1. Importance of self-production. | V | 3.54 | $\mu > 2.5$ | $\mu < 2.5$ | 13.655 | 1.000 | Do not reject |
| 2. Better to buy food. | V | 1.55 | $\mu < 2.5$ | $\mu > 2.5$ | -11.695 | 1.000 | Do not reject |
| 3. Good agricultural profit. | I | 2.46 | $\mu = 2.5$ | $\mu \neq 2.5$ | -0.390 | 0.697 | Do not reject |
| 4. Not liking agricultural works. | I | 1.62 | $\mu < 2.5$ | $\mu > 2.5$ | -9.665 | 1.000 | Do not reject |
| 5. For feeding family members in the city. | I | 3.02 | $\mu = 2.5$ | $\mu \neq 2.5$ | 4.816 | 0.000 | Reject $\rightarrow \mu > 2.5$ |
| 6. Moldovan tradition. | V | 3.39 | $\mu = 2.5$ | $\mu \neq 2.5$ | 10.696 | 0.000 | Reject $\rightarrow \mu > 2.5$ |
| 7. For survival needs of city dwellers. | I | 2.18 | $\mu = 2.5$ | $\mu \neq 2.5$ | -2.989 | 0.003 | Reject $\rightarrow \mu < 2.5$ |
| 8. Lack of other options. | I | 3.10 | $\mu = 2.5$ | $\mu \neq 2.5$ | 5.917 | 0.000 | Reject $\rightarrow \mu > 2.5$ |
| 9. Importance of industrial sector. | V | 2.97 | $\mu = 2.5$ | $\mu \neq 2.5$ | 5.524 | 0.000 | Reject $\rightarrow \mu > 2.5$ |
| 10. For survival needs of the family. | I | 3.25 | $\mu > 2.5$ | $\mu < 2.5$ | 7.395 | 1.000 | Do not reject |
| 11. Importance of ancestors. | I | 3.48 | $\mu > 2.5$ | $\mu < 2.5$ | 12.092 | 1.000 | Do not reject |
| 12. Better products from supermarkets. | V | 1.67 | $\mu < 2.5$ | $\mu > 2.5$ | -9.241 | 1.000 | Do not reject |
| 13. Country future in agriculture. | V | 3.08 | $\mu = 2.5$ | $\mu \neq 2.5$ | 6.564 | 0.000 | Reject $\rightarrow \mu > 2.5$ |
| 14. Happiness of children in helping. | I | 2.43 | $\mu < 2.5$ | $\mu > 2.5$ | -0.652 | 0.742 | Do not reject |
| 15. Better products from farmers. | V | 3.81 | $\mu > 2.5$ | $\mu < 2.5$ | 30.037 | 1.000 | Do not reject |
| 16. Farming is a good business. | I | 2.47 | $\mu = 2.5$ | $\mu \neq 2.5$ | -0.312 | 0.755 | Do not reject |
| 17. Giving up agriculture if richer. | I | 2.48 | $\mu < 2.5$ | $\mu > 2.5$ | -0.138 | 0.555 | Do not reject |
| 18. Commuter living in the village. | I | 2.59 | $\mu = 2.5$ | $\mu \neq 2.5$ | 0.711 | 0.479 | Do not reject |
| 19. Sale of surplus land. | I | 2.23 | $\mu = 2.5$ | $\mu \neq 2.5$ | -2.258 | 0.026 | Reject $\rightarrow \mu < 2.5$ |
| 20. Producing more for selling the surplus. | I | 2.75 | $\mu = 2.5$ | $\mu \neq 2.5$ | 2.179 | 0.031 | Reject $\rightarrow \mu > 2.5$ |
| 21. Better to rest than producing a surplus. | I | 2.49 | $\mu > 2.5$ | $\mu < 2.5$ | -0.081 | 0.468 | Do not reject |
| 22. Agriculture exhausting activity. | V | 3.33 | $\mu = 2.5$ | $\mu \neq 2.5$ | 9.628 | 0.000 | Reject $\rightarrow \mu > 2.5$ |
| 23. Keep farming even if richer. | I | 3.51 | $\mu > 2.5$ | $\mu < 2.5$ | 12.400 | 1.000 | Do not reject |
| 24. Never sell land. | V | 3.30 | $\mu > 2.5$ | $\mu < 2.5$ | 8.426 | 1.000 | Do not reject |
| 25. Agriculture is good for health. | V | 3.06 | $\mu = 2.5$ | $\mu \neq 2.5$ | 5.571 | 0.000 | Reject $\rightarrow \mu > 2.5$ |
| 26. Moldova in the world means food. | V | 3.49 | $\mu = 2.5$ | $\mu \neq 2.5$ | 13.964 | 0.000 | Reject $\rightarrow \mu > 2.5$ |
| 27. Better life quality in Chișinău. | V | 2.06 | $\mu < 2.5$ | $\mu > 2.5$ | -4.135 | 1.000 | Do not reject |
| 28. Punish people who abandon their land. | V | 2.97 | $\mu > 2.5$ | $\mu < 2.5$ | 4.677 | 1.000 | Do not reject |
| 29. Urbanization for working. | I | 1.54 | $\mu = 2.5$ | $\mu \neq 2.5$ | -10.587 | 0.000 | Reject $\rightarrow \mu < 2.5$ |
| 30. Better children outside agriculture. | I | 3.21 | $\mu > 2.5$ | $\mu < 2.5$ | 8.3526 | 1.000 | Do not reject |
| 31. Importance of homemade wine. | V | 3.16 | $\mu > 2.5$ | $\mu < 2.5$ | 6.363 | 1.000 | Do not reject |

Source: Author's survey (Spring 2015). (a) Statement formulated as a general declaration of value (V) or referred to the individual farmer (I); (b) Mean answer (1 = totally disagree, 4 = totally agree).

The 31-item Likert scale inserted in the author's questionnaire includes both statements requiring a value judgement and other regarding specific attitudes of the interviewees and his family. Nine topics are touched upon: 1) the importance of homemade food compared to purchased one; 2) the role of land; 3) the profit-maximization attitude;

4) intergenerational relations; 5) the perception of agricultural works; 6) urbanization and rural life; 7) farming in comparison with other activities; 8) agriculture in the future of the country; 9) the role of farming for family survival.

Table 5 includes hypothesis testing for the mean evaluation of Likert scale statements by farmers. The alternative hypothesis is bidirectional in case no specific trend is expected, unidirectional otherwise. As possible answers range from one (total disagreement) to four (total agreement), the mean answer is 2.5. The following beliefs are observed:

1) A good housekeeper must produce his own food, and especially wine, which has an important social role, even if he owns the financial means for purchasing these products; in general, respondents consider food purchased from fellow farmers through direct knowledge much better than food purchased in shops, due to safety concerns.

2) In general, land should never be sold, and there is widespread disapproval for people who leave their land fallow. However, this is a forced choice, as they lack financial resources; therefore, the land should be given to families that have the possibility of farming it, rather than punishing the owners. It must be done though leasing contracts: indeed, when asked if they would sell their "surplus" land, although more open, farmers were still disagreeing.

3) No clear profit-maximization attitude is observed: farming is not a good business, as it does not allow to obtain a decent profit. No clear trend is observed when people are asked to choose between resting and producing more; however, a slight majority of them would like to have an output surplus, and sell it whenever there is a possibility.

4) Generational continuity is important: farming is an activity handed down from ancestors to the present generation, which, in turn, will pass it down to the next. Parents would like their children to find a better-paid job in the non-farm sector, but they also want them not to forget agriculture and to keep farming the family land; however, the attitude of children toward agricultural works is not significantly positive.

5) Farmers engage in farm works because they really like this activity and consider it healthy, although exhausting.

6) Life quality in rural areas is healthier and safer than in the capital; hence, a significant majority of respondents, especially the elderly, would not move to towns even if they find a good job there; as for commuting, the attitude of working-age people (they were the only ones asked this question) is not significantly different from the mean.

7) A significant majority of people would keep farming as a side activity even if earning a better income off-farm.

8) Farming is a key constitutive element of Moldovan tradition and it will still play an important role for the future of the country, since Moldova is renowned in the world almost exclusively for its food. However, the national government should work for creating more jobs in the industrial sector.

9) Without farming, a significant majority of families would not have enough resources for surviving, as alternative options are lacking. Many farmers are motivated by the desire of providing homemade food to family members who moved to the city, although a narrow majority of the latter would be able to survive even without provisions.

Apart from testing the average answers of farmers, the main drivers of farmers' livelihood choices are extracted by means of principal component analysis. In order not lose information, missing values are replaced by the mean answer (2.5). The Kaiser-Meyer-Olkin measure scores 0.654, which is acceptable but still mediocre. Overall, ten components have an eigenvalue over the unit and are, hence, retained. Table 6 reports all loadings with a value over 0.2. Each component is assigned a label, based on the Likert scale items that present the highest loadings.

1) "Traditionalism and fatalism" is positively associated with an attitude that links the condition of farmer with the Moldovan identity and the need to live according to traditions, without a real individual choice; it is negatively associated with modernity, and with dislike for agricultural works; most farmers present a high median score.

2) "Food and health" is positively associated with mistrust for purchased food and appreciation for homemade food and wine, but also with awareness that farming is a hard work; most farmers present a quite high median score.

3) "Profit-mindedness" assumes a positive value for profit-oriented respondents, who treat their farm like a business and therefore work more for producing a marketable surplus rather than resting; these farmers are also ready to quite agriculture if they are offered a better-paid job in other sectors; the median score is only slightly positive.

4) "Family survival" assumes a positive value for subsistence-oriented respondents, who produce mainly for feeding their family, including members who moved to the city, and are, thus, not interested in marketing; the median score is slightly negative.

5) "Drudgery aversion" is positively associated with people who do not consider farming an unpleasant, unavoidable duty, but rather a life choice justified by the present economic conditions; therefore, they take it easy, avoiding producing more than needed; the median score is slightly positive.

6) "Unwanted duty" assumes high values for respondents who stressed the drudgery of agricultural works, and are ready to quit farming and move to the city, if they are offered the opportunity; the median score is close to zero.

7) "Intergenerational continuity" is positively associated with answers that stress the importance of ancestors and of transmission of the land and of the love for farming to the next generation; the median score is slightly positive.

8) "Rural non-farm" assumes a positive value for farmers who appreciate life in rural areas but are not so interested in agricultural activities, and are therefore ready to buy food and sale land; the median score is slightly negative.

9) "Open-mindedness" assumes positive values for farmers who showed a progressive, future-oriented attitude and confidence in the developing potential of the non-farm sector; the median score is negative.

10) "Disorientation" detects farmers who gave contradictory answers to closely related questions, e.g. showing preference for both purchased and homemade food, or disapproving land sales while agreeing to sell their plots. Indeed, in case respondents contradicted themselves, rather than warning them, interviewers read the statement a second time, selecting the contradictory answer unless the respondent detected his mistake.

**Table 6. Principal component analysis: loadings and median scores of respondent farmers.**

| Variable | CP1 | CP2 | CP3 | CP4 | CP5 | CP6 | CP7 | CP8 | CP9 | CP10 | (b) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Eigenvalue | 4.950 | 2.559 | 2.196 | 1.824 | 1.759 | 1.532 | 1.375 | 1.312 | 1.157 | 1.082 | NA |
| Cum. var. (%) | 15.97 | 24.22 | 31.31 | 37.19 | 42.86 | 47.80 | 52.24 | 56.47 | 60.20 | 63.69 | NA |
| 1 (a) | 0.249 | | | | | | | 0.240 | | **0.268** | 35.53 |
| 2 | -0.233 | | | | | | | **0.301** | | | 37.20 |
| 3 | (c) | | 0.269 | | | | | | | | 46.07 |
| 4 | -0.215 | | | | | 0.211 | | 0.213 | **-0.330** | | 37.34 |
| 5 | | | | **0.426** | 0.239 | | -0.288 | | | | 23.36 |
| 6 | 0.227 | | | | | **0.356** | | | | | 39.39 |
| 7 | | | 0.239 | **0.466** | | | | | | | 28.78 |
| 8 | | **0.276** | | 0.211 | **-0.286** | 0.214 | | | | -0.219 | 35.65 |
| 9 | | | 0.220 | | 0.217 | **0.294** | -0.287 | | | -0.212 | 43.69 |
| 10 | | **0.266** | | 0.235 | **-0.281** | | | | | | 31.99 |
| 11 | 0.226 | | | | | **0.324** | | | 0.210 | **0.277** | 33.20 |
| 12 | | **-0.262** | 0.214 | | | | | **0.341** | | **0.352** | 30.00 |
| 13 | 0.207 | | | | | | | | **0.408** | | 51.08 |
| 14 | | -0.208 | | | | 0.299 | | | **-0.396** | | 34.35 |
| 15 | 0.208 | **0.261** | | | | | -0.276 | | | | 36.08 |
| 16 | 0.249 | | **0.317** | | | | | | | | 31.18 |
| 17 | | 0.236 | **0.350** | | | | | | | | 42.65 |
| 18 | | 0.213 | **0.328** | | | **-0.414** | | | | | 22.01 |
| 19 | | | | **-0.350** | 0.302 | | | 0.224 | -0.221 | **-0.328** | 28.65 |
| 20 | | | **0.348** | -0.213 | | | -0.215 | | | | 15.39 |
| 21 | | | -0.294 | **0.317** | **0.379** | | 0.274 | | | | 39.25 |
| 22 | | **0.362** | | | | 0.265 | | | | 0.263 | 37.43 |
| 23 | 0.241 | | | | | **-0.321** | | | -0.212 | | 43.46 |
| 24 | 0.218 | | | | | 0.243 | | **0.295** | | -0.230 | 45.25 |
| 25 | 0.203 | -0.230 | | | | -0.290 | | | | | 46.75 |
| 26 | 0.222 | | | | 0.251 | | | | 0.277 | | 31.98 |
| 27 | | | | | | 0.235 | | **-0.441** | 0.235 | **0.262** | 43.00 |
| 28 | **0.253** | | | | | | | 0.236 | | **0.300** | 40.59 |
| 29 | | | | | 0.271 | **0.315** | | | 0.216 | | 35.13 |
| 30 | | 0.203 | | | **0.318** | | **-0.374** | | | | 51.66 |
| 31 | | **0.284** | | | | | | | | | 27.36 |
| Median score | 0.452 | 0.180 | 0.050 | -0.004 | 0.055 | 0.031 | 0.051 | -0.021 | -0.104 | -0.021 | NA |

Source: Author's survey (Spring 2015). Note: (a) Item number in the Likert scale; (b) Share of variance not explained by the first 10 components (%); (c) Only loadings with an absolute value over 0.20 are reported; loadings with an absolute value over 0.25 bold, over 0.30 underlined.

The analysis of family farmers' answers shows that profit-maximization is only one of the many drivers of their livelihood choices, and not even the most important. Following Hannson *et al.* (2013), it is possible to group them

into negative "pushing factors" (due to necessity) and positive "pulling factors" (arising from opportunities). Among the former are a strong fatalist attitude and a focus on survival rather than on self-expression. Parents handed down farming to their children, and this pattern should continue for guarantee the continuity of the family. In this context, which was foster by the economic downturn, land represents an essential asset, whose ownership must be preserved. Moreover, mistrust of formal institutions and complex organizations undermines the confidence for purchased food. The preference for direct knowledge as a form of quality guarantee hinders the development of effective markets of agricultural output. "Pulling factors" can be summarized with the concept of "*independence*", which does not fully correspond to financial independence. Indeed, differently from waged workers, farmers do not have a boss and are the creators of their own destiny, within the conditions provided by the fate. Farmers obtain social appraisal and feel fulfilled if they are able to feed, and to offer good wine, to their family, including members who moved to the city, and to their guests. A recurring term, derived from the concept of "*gospodărie*", is "*gospodar*", which may be translated as "(good) master of the house". According to the Explanatory Dictionary of Romanian Language, a "*gospodar*" is not just «a person who owns a *gospodărie*», but also «a person who shows ability, mindedness in managing a *gospodărie*, or a public activity»[13]. The objective of every countryside dweller, and of farmers in particular, is to be, and be considered, "*gospodar*". This feeling of satisfaction is related to rural location and to the strong interfamily connections that can be found there. In this regard, a large intergenerational gap is observed: young family members are more willing to move to cities, even permanently, for pursuing a non-farm centred livelihood. However, this does not imply disregard for agriculture, but rather a widespread desire of keeping farming, even as a side activity.

Economic analysts and policy makers should consider these issues when focusing on family agricultural, as they could hinder responsiveness of farmers to policies. An important implication is that, *ceteris paribus*, non-farm centred livelihoods that allow families to earn an equivalent income are likely to grant them a lower level of utility (life satisfaction). Land ownership, the links with the countryside, and homemade food production need to be preserved.

## 4.3. Inside the Moldovan Family Farm: A Survey-Based Description

The present paragraph describes the main features of a typical Moldovan family farm, based on the information collected through the author's survey. First, the external environment where the family operates (the Moldovan village) is described. In order to clarify the connections between the family and the farm, the third section focuses on family resources, i.e. potential agricultural inputs (labour force, land, domestic animals, and capital). The fourth one deals with financial resources different from farm income (wages, State transfers, and remittances). Then, the focus shifts on production strategies, which include the production basket of the farm (market and self-consumption crops), allocation of labour input for different agricultural tasks, purchase of variable inputs and payment for mechanization services. Following this input-output approach, the sixth section concentrates on how agricultural production is used (self-consumption, marketing, presents, etc.), including home processing of farm products, and selling strategies. Then, issues such as long-term investments, their financing, and the relationship with the State (taxation) are illustrated. The eight section lists alternative livelihoods resulting from the previous conditions, focusing on key aspects like land inheritance and the generational gap.

### 4.3.1. Family Characteristics and Decision-Making

The Moldovan household is a nuclear one and neolocal residence is prevailing, i.e. the married couple resides separately from both the husband's and the wife's parents. Therefore, the family size is small: already in 1893, the average family size in the Bessarabian governorate was the smallest of Russian Empire (4.5 members) (Chayanov 1966, p. 55). Even if the law does not acknowledge this custom, traditionally the husband has to provide a house to the new family, so that a young couple can provisionally live with the husband's parents. Moreover, the youngest child must take care of the old parents, even by moving to their house. Therefore, three generations can live under the same roof. At the ends of the survey, interviewers consider as members of a family the married couple (or single

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[13] Institute of Linguistics of the Romanian Academy, https://dexonline.ro/definitie/gospodar [Accessed: 25th October 2015].

parent) and their non-married children (regardless of their age). These people are counted even if they are living in the city, or have migrated abroad. In case other people are living in the same house, interviewers consider them part of the family only if they are cultivating the land together, i.e. they have a single farm with one "budget". Then, the role of each household members is assessed in relation to the self-declared head. Using these criteria, the average family size is 3.1 members, the median three. Out of 126 household heads, there are 104 spouses, 132 children, eight children-in-law (i.e. married couples living with the parents of one of the spouses), 15 grandchildren (of whom three are left with their grandparents by a couple who had emigrated), and seven parents (i.e. widowed people living with their married children). Overall, 28 people from 23 families are abroad; among them, 11 are in the Russian Federation, and seven in Italy. The number of people residing in the city is double (56), and a large majority of them (44) are children rather than the parents. Due to international migration and urbanization, the average age of the present members is 44.5 years, compared to 41.8 overall. The rapid ageing of rural population emerges even more clearly when considering the median values: 50 and 43 respectively.

Apart from age, sex and present domicile, other data on family members were collected. A relevant information is the level of education in agriculture: out of 350 family members aged over 15, 11 (3.1%) have a university degree, 24 (6.9%) specialized secondary education, and eight (2.3%) professional education. This high share of educated people is a legacy of the role of the Moldovan SSR in the division of labour among Soviet Republics. E.g., the small village of Cucuruzeni de Sus, in the Orhei district, where interviews were collected, rose up around an agricultural school, now closed. In Găgăuzia, interviewers carried out the survey at the Technical Agricultural College of Svetlîi. This is one of the eight institutions, directly subordinated to the MAFI, where students can still receive specialized secondary education in agriculture. Two of them are specialized in viticulture and winemaking, and in zootechnics and veterinary medicine, respectively. Five of them are in the North, the most fertile and export-oriented area of the country, two in the Centre, and only one in the South.

### 4.4.2    The External Environment: Villages and Connections

The Moldovan rural population lives in 1,439 localities (846 municipalities) with an average of 1,423 inhabitants each. The survey involved farmers from 34 villages and two local towns. Based on 2004 Census data and excluding the towns of Orhei (25,641 inhabitants) and Florești (13,164), the population ranges from 319 inhabitants in Ocnița-Răzeși (Orhei) to 7,570 in Corjeuți (Briceni); the average population is 2,262 inhabitants, the median 1,887. The villages can develop along a major road, or being the final destination of a secondary road. In the former case (e.g. Svetlîi, Step-Soci), they have a stretched form, with a central paved road and mostly unpaved cross streets. In the latter case, their form depends on the period when they expanded. Older villages, and those in hilly areas show an irregular road network, and only the main road is usually paved (e.g. Chiștelnița, Vărzăreștii Noi); planned villages and those in plain areas (e.g. Pelivan, Sărătenii Vechi) are laid out on a grid and most of their roads can be paved. Villages born before the 20th Century, which expanded significantly during the Soviet Union, can present a diverse structure in different neighbourhoods. Most families live in single houses of one, at most two floors, surrounded by a garden. Blocks and two-family houses were erected during Soviet times for accommodating civil servants and collective farm workers who choose not to build their own house, but they are not common, and their conditions deteriorated after the collapse of the USSR. The surface of the house plot can reach one hectare, especially in older villages; therefore, the village area is usually very large, even if the number of inhabitants is small. Right outside the village, there is a belt where small shares are situated: most vineyards, orchards, and fields cultivated with legumes, vegetables and corn for family needs can be found here. Further land is less fragmented: here industrial crops (especially sunflowers or alfalfa), cereals and large orchards prevail. Isolated family houses in the countryside are uncommon, but barns and sheepfolds may be found in the small share belt, or next to the village grazing land.

Villages lack most basic services. In village-residences, where administrative councils are based, there is a town hall with the land registry officer, a post office, a police station, and there can be a small clinic with family doctors. Small shops (either State run or private) sell basic food and some accessories (e.g. hoes, electric incubators), but for

most products people must go to town markets. In all villages, there is a "house of culture", built in Soviet times for performing collective activities like theatre, cinema, meetings, etc. Most of them are abandoned; therefore, villages lack meeting places, especially in winter, when the climate is too cold for meeting outside private houses. However, after independence, the Orthodox Church gained popularity, especially among women and old people; therefore, the church is an important meeting place, and the church calendar influences the life of villagers, through religious holidays and even by defining which kind of food is admitted in different periods of the year. Other opportunities for meeting are marriages, baptisms, and funerals. These create important relationships: between the married couple and the marriage godparents (a married couple), and between the baptized children, his godfathers and godmothers (often much more than two) and his parents. The survey shows that people sharing such kind of relationships are the first ones a family can rely on for carrying out agricultural works, like weeding, and grape or corn harvesting.

**Map 2. The Republic of Moldova: villages where the survey took place. Focus on the Răut River Valley in the lower left corner.**
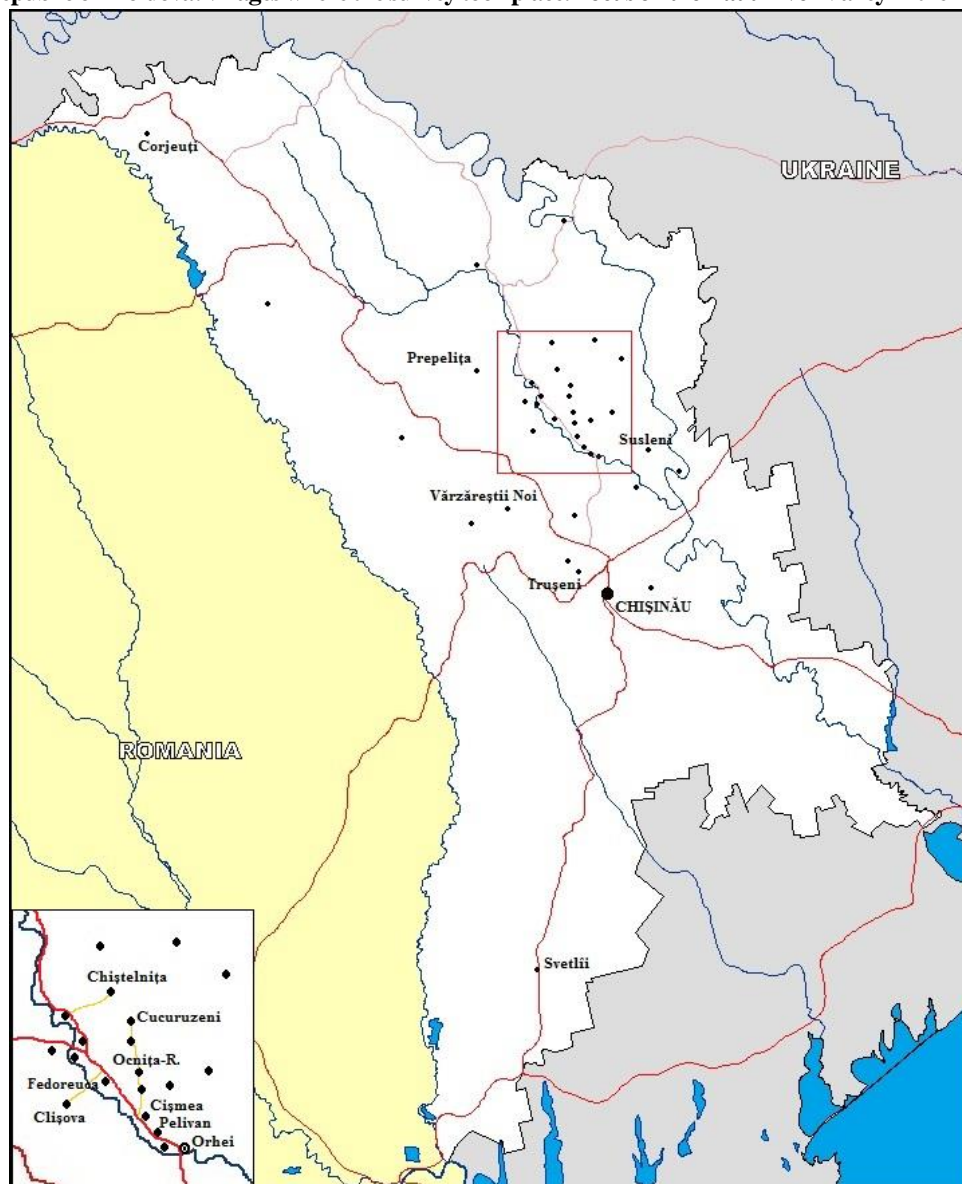


Many of the villages where the survey was carried out lie along the Răut River, upstream Orhei town. On the valley floor, from north to south, there are the villages of Țânțăreni, Codrul Nou, Mândra, Sărătenii Vechi, Fedoreuca and Mitoc. On the valley borders, there are Cișmea, Pelivan, and (on the other side) Clișova. Scorțeni, Chiștelnița, Cucuruzeni de Sus, Crihana, Ocnița-Răzeși, Zorile and Step-Soci are on the surrounding hills, more or less isolated. Susleni is a large village between Orhei and the fertile Dniester Valley. Svetlîi, the only village in the South of the

country, lies in the Ialpug River Valley, the main valley of Găgăuzia autonomous region; Prepelița lies in the northern steppe, along the road connecting Orhei with Bălți; Corjeuți is a big village of Briceni district, in the extreme north of the country. Most of the remaining villages are in the central hilly region, Trușeni being the closest to the capital, so that urban transports reach it. As pointed out in the previous paragraph, population density is quite high and the territory does not present mountains or other relevant obstacles; therefore, villagers can travel to the capital by bus within a day. Travelling takes much either because secondary roads are not paved, or the asphalt deteriorated, or minibuses (the most common means of public transport) stop along the road for carrying hitch-hiking people, and for making passengers get off. The interviewing team was based in Chișinău and in Orhei, and could travel to most of the villages and back from these places within a day, the only exceptions being Chiștelnița, where they had to stay overnight, and Corjeuți, where a local team took the interviews. City dwellers cannot always travel to villages and back within a day, whereas the contrary is possible. Public transport timetables are conceived so that villagers can reach towns to sell their products or shop in local markets, whereas only a few city dwellers go to the villages, unless they have relatives who host them. The same is true when considering Chișinău and district capitals. Indeed, the transport network is organized so that the capital is linked with district capitals, and the latter are connected with all district villages. Due to the habit of minibus drivers to stop along their route, villages located along the main roads (e.g. Prepelița, Sărătenii Vechi) or at walking distance from them (e.g. Cișmea) have an important advantage. Apart from minibuses and buses, other possibilities for families who do not own a private means of transport are car sharing (regularly implemented on secondary roads connecting large villages to towns, like Susleni and Orhei), and taxis, often used, e.g., by the residents of the village of Vărzăreștii Noi for reaching the district capital, due to its low cost.

Out of 126 interviewed families, 57 have a car and four can use the car of one of the children, which corresponds to 156 cars every 1,000 inhabitants (the official figure was 137 at the end of 2013). Most of them declared to use it for transporting agricultural products (grapes and corn), either in the boot, or by connecting it to a trailer. Only five families were not using it at this end. Moreover, several interviewees pointed out that their car dates back to Soviet times and is not working well. Twenty families borrowed a car during the last 12 months, and 15 of them paid for it. Nineteen families (15.1%) own a trailer; they use it together with the car, the tractor or the rototiller. Only seven families (5.6%) own an animal-traction wagon, while one recently sold it, and another put it in a small homemade museum. Although this means of transport was still common in the recent past, most families abandoned it due to lack of demand for transport services and the high cost of maintaining a horse. Only ten families leased an animal wagon for transporting agricultural products or animal fodder, choosing it because of the low price (50-100 MDL).

Famers were asked how they reach their plots and the nearest town market, and how long it takes to get to the latter by public transport. The questions on used means of transport are multiple-choice ones, and respondents can select more than one option. As for the transports used for reaching their plots, 118 farmers answered the question, selecting an average of 1.4 answers. An absolute majority of them (74; 62.7%) reach their land on foot, and a consistent share (51; 43.2%) by car; a smaller number is using a bike (19; 16.1%), an animal wagon (seven; 5.9%), a motorbike or a rototiller (four; 3.4% each), a truck (three; 2.5%), a tractor or public transport (two; 1.7% each). This is consistent with the fact that small shares, used for family needs, are closer to the village. As regards transport to the closest agricultural and food market, the 118 respondents selected an average of 1.2 means. Two people (1.7%) declared that they never go to town, since they are old and someone else shops for them; a large majority (79; 66.9%) is using public transport, followed by the car (45; 38.1%), the animal wagon (four; 3.4%), the bicycle (three; 2.5%), the truck, the tractor and the rototiller (one; 0.8% each). Thirteen people (11.0%) who live in a city, close to a city (Mitoc), or in a village where there is an agricultural market (Corjeuți, Sărătenii Vechi) are going on foot. These answers demonstrate the importance of public transport for farmers who want to buy agricultural inputs or sell their products in town markets. On average, farmers declared that they need 27.6 minutes to reach the closest agricultural market, median time being slightly longer (30 minutes). The longest declared time is 60 minutes, the shortest, five. Apart from the villages of Crihana, Rădeni, Horodiște and Slobozia-Horodiște, where only one household was interviewed and the distance is one hour, the longest average travel time is observed for Clișova and Cucuruzeni de

Sus (42 minutes), Pereni (40), Chiștenița (35), Ocnița-Răzeși and Trușeni (33). Apart from Trușeni, connected to Chișinău by cheap urban transport which takes a long time because of traffic, these villages are not too far from the capital of their districts, but they are situated along secondary roads. This shows once again the large advantage of villages that developed along important roads, and the risk of a growing opportunity gap. Farmers were also asked if it is possible to get to the closest town, and back to their village, within a day by public transport: a large majority (99; 83.1%) answered yes, even in half a day; nineteen of them (16.1%) told that an entire day is needed, and only one (0.8%) affirmed that it is not possible. The last ones, as well as the relative majority of the second group, are from the far northern village of Corjeuți that, however, being a big one, has a market. More than one farmer from Chiștelnița, Sănătăuca and Svetlîi told that they need an entire day, confirming their uncomfortable situation. However, interviewers did not tell people what they meant by "city", so that farmers answered according to their perception, and due to the small size of many district capitals (e.g. Briceni), many of them probably referred to Chișinău.

This paragraph described the external conditions where family farms operate, i.e. rural Bessarabia, its villages, interfamilial relations, and transport networks. It emerges that Moldova is a predominantly rural country with a network of middle-sized villages formed by single-family houses with large gardens devoted to agriculture. In order to access local agricultural and food markets, farmers need to reach the capital of the district, or big villages. Since most families do not own a private car, they have to rely on public transports; residents of the villages situated along major roads have an important comparative advantage.

### 4.4.3.    Family and Farm Resources: Land, Labour, Animals and Capital

Farming households own four main resources they can use in agricultural production: land, labour, animals, and capital. Although land ownership was granted to almost all families by the privatization process, quality and location of plots may vary a lot, and access to land may be difficult for people without a farming background, so that land may be considered a quasi-fixed factor. Labour is a relatively abundant factor, which may be used in sectors other than agriculture, even if this often implies urbanization or migrating abroad. Farmers may renew their animal stock every year, depending on capital availability; however, the purchase of big animals (e.g. milking cows) can be considered a long-term investment. Capital includes agricultural equipment, which is barely renewed, due to high costs, and financial resources used to purchase variable inputs, or to pay for mechanization services.

As explained above, Moldovan households own three types of land: the house plot, the small share (called also garden) and the big share. Land commissions distributed the agricultural land of each municipality to entitled people after deducting the "reserve land" and an area to be used as grazing land. As a result, the size of the big share differs in every village and tends to be larger far from Chișinău. Since the small share represents the household land assigned already in Soviet time, its surface is around 0.1 hectares per member of the family before the collapse of the USSR, and it is usually scattered in several plots, which can be far from each other. Big shares are situated outside the small share belt, and each individual share includes different types of land in fixed proportions, based on availability, i.e. on the specialization of the formers collective farms (arable land, fruit orchards, and vineyards). Individual shares are not always physically delimited. Moreover, after Moldova lost access to the Russian market and the production started exceeding the demand, in many villages orchards and vineyards were removed in order to get more arable land, or used as a source of firewood. Apart from land, also the fixed capital of collective farms (buildings, processing factories, agricultural equipment, etc.) was nominally distributed among former workers; however, due to inflation, it lost almost all of its value. Another type of land is the dacha garden, as city dwellers can consider a house in the countryside. Children who do not manage (or do not want) to sell their parents' rural house once they are not in life anymore, may keep farming the house garden. There are two of such cases in the survey sample.

According to the survey, many families who received a big share are leasing it to a local so-called "leader". The leader had usually been the head of the local collective farm; when privatization started, he found himself in a favourable position, and took advantage of it for grabbing as many resources as possible. Thanks to this situation, he acts as a quasi-monopolist in the land rental market of the village. After the local land commission identified the plots on

the map, they did not automatically inform the new owners about their location, but rather offered them the possibility of leasing the land to the leader. If they did not want to, they could have to embark on a complex administrative procedure for having their plot physically delivered, arguing with employees of the town hall without being provided clear and complete information. Indeed, local leaders are either subletting the land to larger farmers (local or from outside the village), who negotiate directly with them (a possibility granted by article 42 of the Land code, provided that the leasing agreement allows it), or renovating the contract without informing the shareholder, even by falsifying his signature. People can conclude leasing agreements lasting less than three years in front of local land registry officers, while longer ones must be signed in front of a notary, available only in towns. Leasing agreements (whose copy is kept in the town hall) usually foresee a fixed rent (not a share of the yield), which may be given to the owner in kind. However, if the yield is not abundant enough (according to the evaluation of the tenant), owners receive less than agreed, if anything. Even if they do not like this situation, smallholders have difficulties in getting their land back. In case they manage to overcome the administrative difficulties for obtaining it, they can barely find alternative tenants. Moreover, the leaders (who are among the richest people in the village) are lending money for doing mechanization works or for buying inputs at the beginning of the agricultural year. Hence, if a smallholder argues with them, he may have difficulties in being funded in the future. Finally, there is a close relation between leaders and local institutions (sometimes the leader is the village major), so that smallholders can get additional difficulties in performing administrative tasks. Dudwick *et al.* (2007, p. 23) detected a similar situation in the southern region of Taraclia, where «a powerful manager [had] used his ties with municipal authorities and police to prevent all but two well-connected and determined families to withdraw their land», so that «the remaining people […] [were lacking] land titles and [did] not know where their physical plots [were] located». This situation is still better than in villages like Vărzăreștii Noi, where there is no leader interested in renting big shares and the only possibility for people who cannot work their land is to leave it fallow.

In the survey questionnaire, land was divided into four categories, reflecting its destination rather than its status: house gardens (including dachas), vineyards, fruit orchards, and arable land. For each category owned, leased, and rented-in land was recorded. People can easily quantify the land belonging to the first three categories; the fourth includes the small share, which is fragmented in several plots, so that farmers have difficulties in listing all of them. Moreover, due to the cultural disapproval for abandoning land, farmers tend to omit abandoned plots when listing their properties; this is especially true for fruit orchards included in the big share. Table 7 reports important synthetic indicators of land variables for the 124 farmers who filled the relative table in the questionnaire.

**Table 7. Distribution of land among interviewed farming families, by land type.**

| Type of land | No. $\neq 0$ | Min. | Q1 | Median | Q3 | Max. | Average | Total land |
|---|---|---|---|---|---|---|---|---|
| House gardens | 121 | 0.00 | 0.07 | 0.15 | 0.24 | 0.98 | 0.17 | 21.29 |
| Vineyards | 76 | 0.00 | 0.00 | 0.10 | 0.17 | 1.80 | 0.14 | 17.69 |
| Orchards | 30 | 0.00 | 0.00 | 0.00 | 0.02 | 22.00 | 0.32 | 38.38 |
| Arable | 116 | 0.00 | 0.59 | 1.30 | 2.34 | 7.00 | 1.64 | 203.04 |
| Total owned | 124 | 0.04 | 1.01 | 1.86 | 2.81 | 22.00 | 2.26 | 280.40 |
| Total leased | 53 | 0.00 | 0.00 | 0.00 | 1.06 | 6.72 | 0.68 | 84.70 |
| Total rented-in | 13 | 0.00 | 0.00 | 0.00 | 0.00 | 35.50 | 0.56 | 69.77 |
| Total available | 124 | 0.04 | 0.47 | 1.05 | 2.27 | 38.50 | 2.14 | 265.52 |

Source: Author's survey (Spring 2015).

Apart from two families who live in a bloc, and one residing in the city that bought some arable land, all farmers have a garden around the house, which they use for cultivating agricultural products; reported values include only the area used at this end, net of constructed area. More than three fifth of the households own a vineyard; however, this data includes only vineyards in the small share and not those in the house garden; therefore, the vineyard area is even larger. The number of families owning a fruit orchard is probably underestimated, given that many of these are abandoned, and this land cannot be used for cultivating cereals or vegetables. In some cases, respondents probably classified big share orchards as arable land, since they lease the entire big share, regardless of its composition.

Arable land includes both small and big shares; 93.5% of interviewees own some arable land. The average big share is around one hectare; when both spouses were working in agriculture, the family has two shares. Almost half of the interviewees (42.7%) are leasing a part of their land: this is mostly arable land, and includes land given in use. Old people use to donate a part of their land to their children when they get married, so that they can start a new "*gospodărie*", and because landowners get a smaller pension. The number of families who rented land in is much lower (10.5%), and more than half of the total rented-in land is rented by a single family. This gap exists because rented land flows from family farms to large corporate farms, which are not part of the sample. The median total agricultural land in the sample is 1.05 ha, while the average is more than double (2.27 ha), due to a strong positive skewness.

Interviewees gave some additional information about land sales. Five families had sold some land in the previous 12 months (from a minimum of 0.75 to a maximum of 2.00 ha), while two (the second and third biggest farm) had bought 8.4 and 22.0 ha respectively, both of them in order to plant walnut trees. The smaller of these two had to negotiate separately with ten owners of big shares, which show how difficult is for a farm to grow. The price of land varies considerably within the country, and even within districts: two farmers from the village of Ocnița-Răzeși had sold their land for 120 MDL a are, while a farmer from Trușeni, next to Chișinău, was asking for 500 EUR. The large farmer from Criuleni district bought 200 hectares of land for a price ranging from 18,000 to 30,000 MDL.

The survey shows that the land rental market is more developed; therefore, the land rent represents an additional income source for smallholders who lease it. Interviewers asked farmers in which form and how much the land rent is paid in their villages: 21 out of 94 mentioned a fixed sum in money, 60 a fixed sum in kind, nine a percent of the yield, three either a fixed sum in kind or a percent of the yield, while a farmer has only the land tax paid by the tenant. The large farmer from Criuleni confirmed that tenants pay the land tax. Farmers who mentioned a fixed sum, quantifying it in money, receive an average of 2,011 MDL; the median and modal value is 1,000 MDL; two farmers are clear outlier, receiving 10,000 and 15,000 MDL respectively; the minimum rent is 350 MDL, received by two farmers. Among farmers who receive a share of the yield, the average, median and modal value is 20%. Most farmers who told to be paid in kind (39) receive wheat, alone or in addition to other products. The rent in wheat ranges between 100 and 1,200 kg, but these are clear outliers: the average rent is 405.4 kg, the median and modal one 400 kg. In addition to wheat, 16 farmers receive between 50 and 200 kg of sunflower seeds (the average is 83.8 kg, the median 85 kg, the modes 50 and 100 kg); six farmers receive corn in addition to or as a substitute of wheat; three receive fruit (apples), and one barley. Therefore, the typical rent is around 400 kg of wheat plus 100 kg of sunflower seeds, probably depending on the production basket of the tenant. The large farmer from Criuleni district, specialized in fruits, cereals and oil seeds, clarified that the rent is not paid per hectare, but per share, and listed the official in-kind rent: 400 kg of wheat, 100 kg of sunflower seeds, 50 kg of vegetables and 50 kg of fruits, plus the land tax.

**Table 8. Ownership of animals among interviewed farming families, by animal type.**

| Animal type | Owners | No. min. | Median | No. max. | Average | Total | Killed | Former |
|---|---|---|---|---|---|---|---|---|
| Cows | 34 | 1 | 2 | 4 | 1.8 | 61 | 17 | 1 |
| Sheep | 18 | 2 | 6 | 25 | 8.8 | 159 | 62 | 1 |
| Goats | 18 | 1 | 1 | 6 | 2.2 | 40 | 10 | 0 |
| Horses | 10 | 1 | 1 | 2 | 1.1 | 11 | 2 | 2 |
| Bee families | 4 | 2 | 9 | 35 | 13.8 | 55 | 0 | 0 |
| Pigs | 59 | 1 | 2 | 29 | 3.0 | 187 | 97 | 13 |
| Nutrias | 5 | 8 | 36 | 60 | 33.0 | 158 | 7 | 0 |
| Chickens | 104 | 4 | 25 | 150 | 34.1 | 3,616 | 3,751 | 6 |
| Ducks | 57 | 2 | 10 | 50 | 15.1 | 920 | 1,574 | 4 |
| Geese | 23 | 3 | 10 | 50 | 13.9 | 362 | 446 | 6 |
| Other poultry | 22 | 2 | 9.5 | 70 | 15.0 | 329 | 194 | 0 |
| Rabbits | 48 | 1 | 10 | 100 | 19.9 | 957 | 1,177 | 2 |

Source: Author's survey (Spring 2015).

The second resource that allows farmer to get an income are animals. They may be grouped into "ordinary" and "investment" ones. The former include poultry animals and rabbits, that provide stable food (meet and eggs) to the family, and whose stock is renovated every year. The latter are primarily cows and horses, that require additional

care time and provide milk and power respectively, but also sheep, goats and bee families, whose maintenance is less costly, at least if their number is limited like in the respondents' cases. The pig occupies an intermediate position, since its meat is used for feeding the family, but it requires a bigger initial investment and higher feeding costs.

Table 8 reports some synthetic indicators about the types and number of animals owned by interviewees. The first column reports the number of families who owned the respective type of animal at the moment of the survey out of 118 respondents. The last column those who owned at least one in the previous 12 months. The mini-mum, median, maximum, average and total value are calculated on present owners; killed animals include those killed by all families during the last 12 months. It is possible to see the difference between ordinary and investment animals simply by observing the number of animals killed during the year: chickens, ducks, geese, rabbits, nutrias and other poultry (mostly turkeys, pigeons in two cases) have a short lifespan. During the pretesting farmers were asked only the number of animals owned at the moment of the survey; interviewers inserted the question of killed animals in order to bypass the tendency of farmers to declare a smaller number of living animals. This is due to two reasons: fear of taxation, and legacy of the Soviet period, when families owning many animals were classified as rich and suffered social disapproval. By summing living and killed animals, it is possible to have an idea of yearly flows. However, the survey was carried out in spring, when families renovate their poultry stock. Rather than keeping all poultry alive during winter, when egg production is lower, in order to avoid spending on feed, many families kill the majority of them in autumn and store the meat. Therefore, living animals include also chicks, ducklings, which are not necessarily reaching adulthood.

Five households out of 118 do not grow any animal: one is living in a block, four reside in the city and have a house with garden in the countryside. There are no cases of families growing investments animals without growing any ordinary animal, and only three do not grow chickens. People keep ordinary animals in a dedicated place within the house garden, so that owning a garden is a necessary condition in order to grow them. Investment animals are also kept in the garden, with a few exceptions (e.g., the household who owns 25 sheep has a fold outside the village), but in the warmer months they need to be put to the pasture during the day. Villagers deal with this issue collectively. Cows and goats are led every morning to the centre of the village, where a cowman collects them and takes them to the public grazing land. Sheep remain permanently in the countryside during the warm months of the year. If no shepherd is available, owners take care of all animals by turn, for a number of days proportional to the number of animals they own. While owners milk their cows early in the morning or late in the evening, sheep are milked all together in the village fold: each owner takes all milk for a number of days proportional to the number of owned sheep. Such arrangement creates strong social constraints: everyone must allocate part of his family time for taking care of the herd. Families use to keep goats together with the sheep, apart from six families, who own only a goat and can tie it to a pole – a less time demanding strategy. There are no territorial patterns in animal ownership, apart from the prevalence of sheep in Găgăuzia, favoured by the presence of the less productive steppe, suitable for extensive rearing: all five households from this region own sheep, and no cow. Maps 7-10 in the Appendix illustrate the average number of animals owned per 100 farms in each district.

Horses, cows, sheep and goats represent the base for the grazing tax. This tax is due to the local municipality for using the public grazing land, regardless whether the family puts its animals to the pasture or not. Every local land registry office calculates the tax by dividing total yearly management costs by the number of animals in its territory; the unitary amount differs for every animal. This topic will be examined in depth within the sixth paragraph.

The large number of families who used to grown some pigs in the previous twelve months but did not have any during the survey shows the intermediate position of this animal. While farmers keep adult cows, sheep, goats and horses alive as a capital, killing or selling young ones, they kill pigs during adulthood, usually before Christmas, and not every year. When the survey was carried out, many families had not bought a new piglet yet.

The third resource owned by families is capital. Financial means will be described more in depth in the following section; here, the focus is on agricultural equipment. The level of mechanization of Moldovan family farms is low. Most of the agricultural machinery owned by large collective farms were not suited for the new, small private

plots. Even if the shares distributed to workers included also a share of the value of these machines, people occupying favourable positions sold a part of them during the tumultuous years of the privatization. The remaining ones lost most of their value due to following devaluations of the national currency, were not used for a long period, and cannot be repaired because of lack of spare parts. Small farmers, thus, keep carrying out most farm works by hand, like in their individual plots in Soviet time, and pay machine owners for mechanization services.

Farmers had to list the agricultural machines they own. Out of 118 respondents to this question, 24 (20.3%) own a tractor, but seven of them use it only for transportation, due to its old age, and pay someone else for mechanization services; just two families own two tractors each. Then, 13 families (11.0%) own a plough, 21 (17.8%) a rototiller, ten (8.5%) a seeder (a farmer owns two), two (1.7%) a combine (but one of them is old and is not working well) and three a pump used for extracting irrigation water from a close river. As regards transportation means, 19 farmers (16.1%) own a trailer, 11 (9.3%) a truck and seven (5.9%) an animal wagon. Finally, several farmers own simpler instruments like grape presses (48; 40.7%) and electric grinders for preparing animal feed (52; 44.1%). The horse is a clear alternative to tractors for poorer farmers (no tractor owner has a horse). The rototiller has partially the same role: out of 21 owners, 13 do not have a tractor which can be used for doing agricultural works. However, the use of this well-suited instrument is uncommon, since buying one of them is still a too big investment for small farmers.

Two facilities for intensifying agricultural production detected by the survey, but for which there was no specific question, are small greenhouses, and drop irrigation installations, often associated. Most greenhouses can be found in the house garden rather than in the open fields, due to fear of thefts, and to the small scale of production. A third, fundamental infrastructure is the well. Also in this case, no specific question was foreseen, but when asked about expenditure for irrigation water or electricity during the last 12 months, several farmers mentioned that they owned or had access to a well. Out of 115 respondents, 17 paid for electricity for extracting water from it, the others either extract the water by hand using a pulley, or do not own any well. Since irrigation infrastructures have high maintenance and running (electricity) costs, most of the networks built in Soviet times were dismantled, stolen, or simply deteriorated. Therefore, the well is the only possibility for watering. The only exceptions are three farmers whose fields border a river and, thus, extract the water from it using a pump. The well is a constant presence in Moldovan villages: often decorated with religious paintings and low reliefs, which demonstrate the quasi-holy nature of water, it may be situated in a house garden, or along the street, so that the whole neighbourhood can benefit from its water.

The fourth and maybe most interesting resource to enquire is labour. This resource is relatively abundant, due to the lack of employment opportunities outside agriculture in rural areas. However, its productivity is low, because of the low level of mechanization and a conservative attitude of farmers, especially the elderly, who keep using old, inefficient farming methods. Labour means family time: families may choose to use it on farm, to help other farmers in agricultural works, in the local off-farm sector (if such opportunity is available), or to sell it in the off-farm sector outside the village, i.e. move to the city, or migrate abroad. In addition to their time, household can benefit of hired labour, paid or voluntary. In this sense, labour has an additional function: strengthening interfamilial relations. It is worth citing a farmer who was asked how many working days he spent weeding. He told that when he weeds alone he needs two days; instead, when his friend goes to help him, an entire week, since the meaning of working together is not increasing efficiency, but spending a good time together. For all these reasons, labour input is very difficult to quantify. The questionnaires used in the Agricultural Census and in the *Survey on Small Producers* do not include any question on labour input, apart from salaried workers, who have a marginal role in small farms. Only the Census foresaw a question on family members who helped in agriculture during the last agricultural year. The HBS tries to overcome these problems by asking the number of working hours in the week of the survey, but due to seasonality of agricultural works, the results are hardly extendible to the whole year if not at aggregated level. Here, we focus on the available time of interviewees and on the dynamics regulating the circulation of labour among smallholders.

Rural household members who declare to work in agriculture dedicate an average of 6.8 months to this activity, while the median value is eight months. Due to climatic conditions, there are no agricultural tasks to be performed in winter; nevertheless, animal owners must dedicate to them a certain amount of time every single day of the year.

It is not possible to treat farming as an ordinary job: if a family owns (and farms) some land, all time of its members is potential agricultural labour time. While pensioners and people who do not have an off-farm job dedicate all but winter months to farming, members residing in the city (e.g. university students) help them during the weekend or in their free months, when they come back to their villages. The small size of the country and the fact that urbanization is relatively recent (so that almost all city dwellers still have relatives in rural areas) favours this pattern. Due to religious reasons, people seldom perform agricultural tasks on Sundays. As already mentioned, the average household size is 3.1 members; the average number of members over 15 is 2.8, of whom 2.1 reside in the village and, hence, can perform agricultural tasks. Out of these 266 members, who represent the potential agricultural labour force, 125 have an off-farm job (either as employees or self-employees), for an average of 34.4 hours a week *per family* (i.e. summing up working hours of all members). Under the hypothesis that these people work up to eight hours a day, six days a week, while members residing in the city can dedicate to agriculture one working day per week, sampled households have an average of 71.4 hours to use in the family farm (the median value is 64), and the range 0-264. Actually, there is no correlation between this quantity and the land farmed by the family in the survey sample.

Agricultural work is subject to seasonality; therefore, the amount of required labour input varies a lot along the year, and family labour is not always sufficient, while in winter months there is a consistent surplus. Villagers solve this issue by carrying out exchange of labour: if family "A" needs to perform a task (e.g. weeding or grape harvesting) within a limited number of days, family "B" assists them. Then, the former helps the latter in performing the same task within its plots. In general, total family time remains an absolute constraint, since families must be able to give back the received hours of work. This is not true for people in difficult situations, like the elderly, widowed parents, etc. Therefore, it is more correct to speak of labour redistribution along the family lifespan: young and well-off families assist other families, and expect to receive the same treatment in the old age or in case of health or other problems. However, many interviewees reported that this system is breaking down due to massive urbanization and migration. Out of 117 farmers who answered to the relative question, 106 (90.6%) receive free agriculture labour: 65 (55.6%) from relatives living in the village, 31 (26.5%) from relatives living in other localities, 29 (24.8%) from friends living in the village, four (3.4%) from friends living in other localities, and 43 (36.8%) from neighbours[14]. Relatives do not include family members living outside the village, which are counted as family labour. These data show that kin ties resist in spite of distance, while other links work mostly within the village. Interviewers asked to quantify the number of agricultural working days in the last 12 months, receiving 115 answers. The total number of family working days is 5,672 (49.32 per family); paid working days are 1,610.15 (14 per family), and unpaid ones are 972.5 (8.46 per family). However, paid work is overestimated due to the inclusion of mechanization services (i.e. ploughing, seeding, weeding, harvesting, etc.), whereas farmers had big difficulties in reminding the number of working days received for free, so that interviewers marked one single day per agricultural task every time that the respondent could not recall the number of supporters.

Apart from exchange of work, farmers may rely on hired labour. This is an important issue, since the economic approach to agricultural households changes considerably depending on the existence of a labour market. In Moldovan villages, the possibility of hiring agricultural workers is seriously constrained. On the one side, a growing share of young people associate farming with backwardness and do not want to perform heavy agricultural tasks; on the other, there is a strongly negative perception of people working for a wage in someone else's farm. This is a legacy of the Soviet period (when the only employer was the State), combined with the traditional high consideration for the independence granted by land ownership, and a recent admiration for successful businesspersons. Only people who were not able to manage their land, and are not capable enough to become public servants or to open a business have to work for their fellow villagers. The statement according to which «only drunkards work daily in agriculture» (with a consequent low productivity) was widespread among interviewees. Despite this issue, the agricultural daily wage (111 farmers knew the local amount) is quite constant all over the national territory, proving

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[14] The sum of answers overcomes 100% since farmers could select more than one option.

that a market, although imperfect, exists. The wage ranges from 100 to 300 MDL; the average is 141, the first quartile 100, the median and third quartile 150. Apart from this sum in money, in most cases the employer has to provide food and drinks (wine) three times a day, and transport to the field. This happens in almost all cases when the wage is lower than 150 MDL, while such benefits are not included with higher wages; hence, it is reasonable to affirm that the standard wage is 150 MDL. Higher wages (200-300 MDL) are paid for performing tasks requiring a specific expertise, like pruning and tying the vines. As regards the territorial variations, lower wages are observed in isolated villages with a marginal agriculture, like Vărzăreștii Noi and Clișova, while highest ones are paid in Corjeuți, where farming is more market-oriented, and in Trușeni, belonging to Chișinău city-district. Unluckily, there are no data on Găgăuzia.

Large farmers face a different situation as regards labour. E.g., the large farmer from Criuleni district hires daily workers for collecting fruits, a smaller number of seasonal workers, and a few permanent ones. The latter are mostly mechanics and tractor operators, who drive the machines during the agricultural season and engage in maintenance works in winter. Workers are usually paid according to their performance, in order to stimulate productivity. Fruit harvesters receive 4 MDL/kg for collecting cherries; tractor drivers receive 8 MDL/ha for spraying herbicides, 50 MDL/ha for ploughing, 80 MDL/ha for weeding in the fruit orchards. Drivers may earn up to 700-800 MDL a day for spraying, which is a very high figure even compared to urban salaries, but they work only some months a year. Moreover, they have to limit the time of exposure to vaporised herbicides to some days a month, for health reasons. However, these figures give an idea of potential incomes generated by rural jobs connected to the farming sector.

### 4.4.4. Financial Resources: Earned Incomes, State Transfers and Remittances

Rural families can rely on three main income sources: farm profit, earned income, and unearned income. The first one is the difference between farm entries (either in money or in kind, i.e. self-consumption) and expenditures for farm inputs. Unless they are able to perform all agricultural tasks by hand, and they grow seeds, seedlings, and young animals at home, farmers need an additional income source to cover farm expenditures; otherwise, farming is not sustainable in the long term, and farm exit become unavoidable. Earned income includes all incomes that family members obtain by investing part of their time: wages from salaried jobs, profits from off-farm self-employment, and remittances. The latter play a specific role, since emigrants cannot decide to invest just a part of their time in this activity and, at the same time, they are not included any more in the consumption side of the family. Instead, as already pointed out, most family members who work in urban areas may still allocate some time to the family farm. Finally, unearned income includes property income (e.g. rent of apartments in the capital, bank interests) and State transfers (retirement, disability and other social pensions, child allowances, etc.). These do not require any time investment, but the average amount of State transfers is very low.

Interviewees were asked questions on employment of family members, received pensions, and remittances. The precise amount was not asked for privacy reasons; however, a few farmers spontaneously communicated it. A total of 118 interviewees answered these questions: 16 of them (13.6%) can rely on three additional income sources apart from farming (wages, remittances and pensions) in the last 12 months, 49 (41.5%) on two, 48 (40.7%) on one, and five (4.2%) on none. The average number of income sources per family is, thus, 1.6, the median two. It is important to point out that the sample includes only farm households: even if they represent between 71.2 and 69.5% of the HBS sample of 2010 and 2012 respectively[15], these figures are not fully representative of Moldovan households, especially of those residing in the capital, where more jobs are available.

All 126 interviewees answered the question on pensions: 74 households (58.7%) receive at least one pension, of whom three include three recipients, 25 two and 46 one. The average number of pensions per family is thus 0.8, the median one. As for earned income other than remittances (either wages or from self-employment), 94 families (74.6%) have at least one recipient member; 42 have one, 40 two, nine have three, and three have four. Therefore,

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[15] These percentages are calculated using sample weights.

the average number of income earners per household is 1.3, the median one. However, only 126 out of 161 people earn their income in the village (one per family on average), meaning that seven families (5.6%) would not have any income apart from farming if no member had left the village, and 25 (19.8%) would have only pensions. As for remittances, 35 (29.7%) out of 118 families who answered to the relative question had received some money from abroad in the last 12 months, but only 23 families had at least a member out of Moldova during the survey. However, the frequency with which emigrants send money home is not regular: ten families receive something every month, 18 receive money more rarely, and six only in special occasions (marriages, funerals, house reparation works, etc.).

The average monthly pension, among the 17 pensioner who decided to communicate it, is 808 MDL, the median 600 MDL; the value ranges between 306 and 2,000 MDL and includes both retirement and disability pensions. The lowest value corresponds to a disability pension for a 16 years old child. According to the NBS, the minimum living subsistence in the first semester 2015, in villages, was 1,673.70 MDL for the whole population and 1,402.40 MDL for pensioners (one equivalent family member); therefore, people earning such pensions can barely survive without additional income sources.

Although there was no distinction between long and short-term contracts in the questionnaire, respondents were asked the profession, the number of working months in the last 12 months, and the weekly working hours for every family member. Overall, 161 people receive off-farm wages or profits; 39 of them work less than 12 months: most of them are employed in seasonal agricultural jobs (tractor driver, shepherd); only a few are construction workers or occasional workers in the service sector (waiters, taxi drivers). Almost all of them are men, while women tend to have more stable jobs in the service sector (teacher, seller). Seasonal agricultural employees tend to work many hours a week (60 or more) for around six months a year. Forty-three people did not have a full-time job (less than 40 hours a week). The most common job is the driver (21; 13.0%), followed by the seller (19; 11.8%); however, the results are biased, since many interviews were taken in village shops and sellers (or their family members) accepted to answer the questionnaire. Other common jobs are the teacher (15; 9.3%), the accountant (13; 8.1%), the industrial worker (eight; 5.0%), the engineer, the medical assistant and the social assistant (five each, 3.1%). Six people do occasional jobs in different sectors during the year. At least 33 jobs are linked to the agricultural and food sector, among whom 22 tractor drivers and expert in agricultural mechanization services, two shepherds, a pruner, a harvester, a manager of a local milk collection point, a livestock veterinary, and six workers in the food processing industry (wine factories, bakeries, and canned fruit).

It is worth recalling that only jobs outside the family farm are considered. However, in order to assess the impact of agriculture on family wellbeing, interviewees were asked whether in the last 12 months the income from selling their own agricultural output was higher than other incomes excluding remittances: wages, self-employment income, and State transfers. Out of 122 respondents, 44 (36.1%) told that farm income in money is higher, 62 (50.8%) that off-farm income is more that 50% of the total, and 16 (9.9%) that they are more or less the same amount.

In this paragraph, family off-farm income sources were analysed. It emerged that Moldovan farmers rely heavily on pensions and remittances. Although every family includes at least an income earner on average, several jobs are seasonal jobs in agriculture, or family members have to emigrate in the city to find one. Therefore, farm income plays a fundamental role in ensuring family survival, especially among the elderly.

### 4.4.5.   Production Strategies: Inside the Black Box of the Family Farm

This section focuses on production strategies of the family farm, which include both the preferred combination of inputs (land, labour and capital) and the production baskets (either animal or vegetable products). These aspects are very difficult to measure, since small farmers neither weigh their outputs, especially when it is self-consumed, nor know the area used for each crop, because of both fragmentation and the use of multiple cropping. Moreover, as pointed out above, agricultural labour time is not fully separable from family time *tout court*, since farmers neither maximize labour productivity, nor minimize labour input. Therefore, the following figures are rough estimates: a caution that, in the author's opinion, should be extended also to the NBS's HBS and the survey on *Small Producers*.

Rural households do not farm all land they own. On average, interviewees lease 26.6% of it (but the share on total land of the sample is higher: 30.2%). Available land is the sum of non-leased land and rented-in land. Among sampled farmers, rented-in land amounts, on average, to 5.6% of available land, but the share on the total is 26.3%, meaning that larger farms are renting more land. Farmed land is the difference between cultivable and abandoned land. Sampled farms leave 5.2% of their cultivable land fallow on average, corresponding to 3.4% of total cultivable land, meaning that smaller farmers abandon a larger share of land. As already pointed out, interviewees tend not to mention fallow land, due to the negative social perception of it. Moreover, they do not know well the provisions of their leasing contracts. It means that, probably, the area of their big shares covered by fruit orchards and vineyards, which they classify as leased, is, instead, abandoned. The amount of fallow land is larger in marginal villages, like Clișova, Ocnița-Răzeși, Prepelița and, partially, Chiștelnița, and among old families, whose members can barely perform heavy agricultural tasks. Interestingly, an old farmer from Trușeni who uses to sell her products at Chișinău market, decided to leave part of her land fallow because she can earn enough money like this, thanks to the higher selling prices of farm output in the capital. On the other hand, residents of Clișova, situated on the steep embankment south of the Răut River, told that large farms rent the best land on the valley floor, and they are left with marginal land, subject to landslide and barely reachable by old people, who thus abandon it.

**Table 9. Vegetal production among interviewed farming families, by product categories.**

| Product(s) | (a) | (b) | (c) | (d) | No. of farms (detail) | (e) | (f) | (g) |
|---|---|---|---|---|---|---|---|---|
| Wheat | 24 | 6.6 | 0.34 | 14.9 | | 0 | 3,018 | 2,778 |
| Corn | 103 | 34.7 | 0.54 | 21.6 | | 3 | 5,722 | 5,000 |
| Other cereals | 21 | 4.1 | 0.11 | 4.4 | 20 barley, 1 oat | 0 | 2,634 | 2,056 |
| Industrial and feed plants | 45 | 8.4 | 0.39 | 16.7 | 24 sunflower, 11 alfalfa, 6 fodder beet, 3 soy, 1 rapeseed | 1 | 8,123 | 4,000 |
| Beans, peas, etc. | 81 | 4.6 | 0.06 | 2.1 | 70 beans, 8 peas, 3 chickpeas, 3 lentils, 1 broad beans | 16 | 1,426 | 1,250 |
| Potatoes, carrots | 111 | 5.8 | 0.17 | 5.5 | 87 potatoes, 82 carrots | 10 | 10,702 | 8,667 |
| Onion, garlic | 102 | 1.9 | 0.02 | 0.5 | 97 onion, 95 garlic | 8 | 3,307 | 3,000 |
| Tomatoes, cucumbers | 104 | 2.3 | 0.03 | 0.8 | 100 tomato, 90 cucumber | 10 | 6,666 | 6,000 |
| Other vegetables | 89 | 1.8 | 0.02 | 0.6 | 77 red beet, 49 cabbage, 45 pepper, 5 radish, 3 eggplant | 8 | 7,758 | 7,417 |
| Watermelons, melons, pumpkins | 63 | 1.4 | 0.01 | 0.4 | 46 pumpkins, 36 watermelons, 34 melons | 21 | 10,306 | 9,000 |
| Apple, pear, plum trees | 98 | 1.6 | 0.03 | 0.6 | 86 apple (442 trees), 67 pear (170), 44 plum (120) | | 12,671 | 9,063 |
| Cherry, black cherry-trees | 94 | 1.1 | 0.01 | 0.2 | 91 (267 trees), 60 (157) | | 4,500 | 4,177 |
| Apricots, peach trees | 96 | 0.5 | 0.01 | 0.2 | 58 (221 trees), 39 (86) | | 5,203 | 2,246 |
| Walnut trees | 83 | 4.3 | 0.61 | 11.7 | 2,611 trees (*) | | 5,967 | 4,904 |
| Strawberries and berries | 50 | 1.9 | 0.04 | 1.2 | 35 strawberries, 30 raspberries, 3 blackberries, 2 black currants, 1 gooseberries | 7 | 3,605 | 3,571 |
| Vines (grape) | 94 | 16.5 | 0.16 | 6.2 | | | 7,412 | 6,667 |
| Other | 9 | 0.2 | 0.00 | 0.1 | 7 quinces (17 trees) | 0 | 4,028 | 4,265 |
| Abandoned | 20 | 5.5 | 0.08 | 3.4 | | | | |

Source: Author's survey (Spring 2015). (a) Number of farms, which cultivate that product(s) (out of 118); (b) Average share of land in the single farm (%); (c) Average land area in the single farm (ha); (d) Share of total farmland (%); (e) Number of farms that do multiple cropping involving that cultivation (out of 119); (f) Average yield (kg/ha); (g) Median yield (kg/ha). * 2,200 plants only in one farm.

Table 9 reports, for each vegetal product, the number of farms that cultivate it, the corresponding land, and average and median yields. Family farms use different types of land for different crops: if they do not lease their big shares, they use them mostly for cereals (wheat or barley) or industrial plants (sunflowers or alfalfa); only a few farms, in the villages of Corjeuți and Codrul Nou respectively, grow higher value added crops in large quantities, i.e. potatoes and berries. This is a forced choice, due to the lack of irrigation facilities; indeed, Codrul Nou is located close to the Răut River, while in the past Corjeuți was involved in a project for developing horticulture. Large fruit orchards are not common among family farmers: most of them have a few trees in the house plot, and some walnut trees bordering their gardens. However, two farmers from Orhei and Criuleni districts, respectively, decided to plant several hectares of walnut trees as an investment. Otherwise, farmers tend to adapt to the conditions determined by the specialization of the former local collective farm. E.g. in Trușeni, where cherry production was developed, farmers are recovering old orchards and planting new ones: a respondent who can get a decent income with just 0.20 ha of cherry orchard mentioned that this strategy is widespread in the village. Thanks to the reputation created

in Soviet times, cherries from Trușeni do not need any expenditure on marketing. Instead, the conditions are very different for large corporate farms: the interviewee from Criuleni district holds 150 ha of productive fruit orchards (apples, plums, cherries, and sour black cherries), and planted 46 more hectares. These, together with cereals and oil seeds, represent the core of his export potential; however, he cannot export directly, but has to sell his output to a few huge private companies, which hold the governmental concession and can easily set the price. Due to the Russian ban on Moldovan fruits, and the difficulty of accessing the EU market, as local fruits neither fit European consumer preferences, nor respect its strict food safety standards, he lost a large sum of money in the last years. In case such surpluses are sold on the tiny national market, fruit prices can drop significantly. This damages also small family farms, which, indeed, often neglect their fruit orchards, or do not collect fruits. Overall, a limited number of farms cultivate their own big shares.

Small shares include most vineyards, which indeed cover the second largest average share of land (16.5%), while the remaining arable land is used for cultivating corn, which covers the largest share (34.7%). Due to the lack of irrigation facilities, corn yields are low; the output is usually stored in outdoor cages and used for feeding animals. Several farmers perform multiple cropping on their small shares, cultivating vegetables and, oftener, melons, pumpkins, watermelons and beans between the rows of maize plants and the vines, or even corn between vines. Apart from the function of using scarce land more efficiently, this practice is aimed at hiding high value added plants from thieves.

Finally, house plots are used intensively, since well water is available and family members can easily take care and protect cultivations. In older villages, where house plots are larger, vineyard and small cornfields may be found even there. The *Small Producers'* survey by the NBS does not detect areas used for each cultivation in house plots; interviewers tried to obtain such figure, or at least a rough estimate. Potatoes and carrots occupy a larger average surface, although this includes a few market-oriented farms from Corjeuți. The most widespread cultivations are, i n this order: tomatoes, onions, garlic, cucumbers, potatoes, carrots, red beet, and beans. A smaller share of farmers cultivate cabbage, pumpkins, pepper, watermelons and melons; and a few of them peas, radish, chickpeas, eggplants, lentils and broad beans. Berries (mostly strawberries and raspberries) are also cultivated in the house plot.

**Table 10. Animal production among interviewed farming families, by product category.**

| Product(s) | (a) | Per animal | | | | Per producer farm | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | average | median | max. | min. | average | median | max. | min. |
| Pork meat preparations (kg) | 32 | 53.0 | 23.0 | 200.0 | 2.9 | 62.6 | 44.0 | 200.0 | 5.0 |
| Cow milk (l) | 35 | 2,623.7 | 2,604.0 | 5,000.0 | 150.0 | 3,724.5 | 3,000.0 | 12,600.0 | 300.0 |
| - Cow cheese (kg) | 34 | - | - | - | - | 344.5 | 257.0 | 860.0 | 30.0 |
| - Sour cream (kg) | 21 | - | - | - | - | 213.0 | 200.0 | 500.0 | 40.0 |
| Sheep/goat milk (l) | 25 | 199.9 | 100.0 | 900.0 | 25.0 | 809.2 | 570.0 | 3,000.0 | 80.0 |
| - Sheep/goat cheese (kg) | 24 | - | - | - | - | 111.0 | 60.0 | 480.0 | 15.0 |
| Sheep wool (kg) | 8 | 2.3 | 2.1 | 5.0 | 1.0 | 9.0 | 9.5 | 12.0 | 5.0 |
| Honey (kg) | 4 | 15.9 | 16.5 | 28.6 | 1.9 | 286.3 | 65.0 | 1.000.0 | 15.0 |
| Eggs (different poultry) (pieces) | 113 | 103.1 | 97.5 | 307.1 | 5.7 | 3,220.2 | 2,700.0 | 13,600.0 | 100.0 |

Source: Author's survey (Spring 2015). Other outputs: Meat in jars (8 farms), butter (2), pâté (1), and beeswax (1); (a) Number of farms producing that product(s) (out of 118).

The number of farmers engaged in animal breeding, as already observed above, is smaller, with the remarkable exception of poultry animals, which are more diffused than any single agricultural product. Table 10 reports the average output obtained from every type of animal, and per producer farm, apart from unprocessed meat. Large gaps in animal productivity can be caused by the fact that some animals are slaughtered during the year; hence, they produce for a shorter period. The high productivity of cows emerges clearly: family farms milk an average of 2,624 litres yearly, corresponding to 3,725 litres per farm (depending on the number of owned animals). As a result, cow breeders obtain an average of 345 kg of cheese of different types, and 213 kg of sour cream, while only two farmers produce butter. Sheep and goats are much less productive, especially the former, although milk production is evaluated at an aggregate level, so that specific productivities cannot be detected for families owning both. Milk produc-

tion per animal is 200 litres on average, corresponding to 809 litres per owning family, since flocks are larger compared to cows. Considering both the highest fat content and the fact that this milk is all used for making cheese, families obtain an average of 111 kg. Moreover, sheep produce wool (2.3 kg each on average), although just a few farmers use it after shaving them. As for poultry animals, the number of eggs available to family farms is huge: 3,220 on average; they come mostly from chickens, followed by ducks, geese, turkeys and pigeons, so that overall, the production is 103 eggs per fowl. From each slaughtered pig, farmers obtain an average of 53 kg of sausages and lard, but the median figure is much lower (23 kg). Interviewees tend to slaughter their pigs when they weigh about 100 kg if they are aimed at being self-consumed, when they are much heavier if they should be sold. Finally, four beekeepers produce an average of 15.9 kg of honey per bee family, but only one of them extracts the beeswax.

In order to obtain the output described above, family farms use their land, labour, and variable inputs. The costs of the latter, together with hired non-family labour, are reported in Table 11. These include animal feed other than self-produced, young animals, seeds and seedlings different from those stored in the previous agricultural season, fertilizers (including manure), pesticides (including several products), irrigation water (including electricity used to run electric pumps for extract it from wells or rivers), mechanization services (including the cost of fuel and maintenance for owners of agricultural equipment) and transport. Mechanization services are by far the most expensive input, accounting for 41.8% of total farm expenditures on average, and the cost born by the largest number of farmers (109, 96.5%). This also mean that the owners of agricultural equipment earn consistent sums of money simply by providing mechanization services to fellow farmers, which explains the large number of drivers among interviewees. Small farmers pay contractors for the tillage, for hoeing vineyards and house plots, seeding (by seeder) and harvesting (by combine) cereals and industrial plants, cutting the alfalfa for animals, spaying the weed killer, etc. Moreover, they pay the owners of transport means (trucks, tractors or cars with cart, animal wagons, etc.) for taking their agricultural output home or to the seat of purchasers. Usually, tractors perform most mechanization tasks, while vineyards and home plots are hoed using a rototiller. The cost depends on the surface involved: farmers pay a fixed amount per are. Usually, when seeding or weeding are carried out, the cost of the seeds and of the weed killer, respectively, are included. The median detected price is 13 MDL/are for seeding, 12 MDL/are for ploughing and harvesting, 11 MDL/are for spaying the weed killer, 5 MDL/are for cutting the alfalfa; for tasks carried out by rototiller, the median cost is higher (20 MDL/are). Given the high mechanization costs, cultivating cereals or industrial plants is not convenient for smallholders. As for their small share, they tend to pay only for unavoidable tasks, i.e. ploughing and, more rarely, seeding, while they weed by hoeing the soil and harvest their corn by hand: out of 103 interviewees growing corn, less than ten had it harvested by a leased combine.

The second highest expenditure share is that for animal feed and animals, although only 57 farms (50.4%) spend for it. Unfortunately, due to a shortcoming of the questionnaire, the expenditure for purchasing young animals was not systematically detected; moreover, during data processing, the working days of contractors were counted among hired days of labour, although their cost is already included within mechanization services, and it is not possible to exactly deduct all of them. Hence, labour costs are overestimated, while the animal costs are underestimated. Overall, the former represents 12.2% of farm expenditure, followed by seeds and seedlings (11.5%), and then by pesticides (5.9%). These three are also the most widespread costs after mechanization services (85.8% of farmers pay for seeds and seedlings, 77.9% for pesticides, and 68.1% for labour). Instead, only 24.8% of farmers purchase some kind of fertilizers, also because another 20.4% use manure from their own cows or, more rarely, from chickens. The most common purchased fertilizer is potassium nitrate, followed by ammonium nitrate, urea, and peat. However, only larger, more commercially oriented farmers fertilize their fields, unless homemade manure is available.

The most common purchased animal feed is grinded corn, followed by alfalfa, barley, the husk of sunflower seeds, barn, and hay. As for seeds, the largest cost is due to corn, followed by wheat, sunflower, alfalfa and barley. Vegetables are seeded using seeds and bulbs from the previous agricultural season, the most remarkable exceptions being tomatoes and onions: almost all farmers who cultivate them buy tomato seedlings and chives. Pesticides are

a large category that includes medicines for plants, weeding killers, insecticides, medicines for animals, veterinary controls, and hydrated lime (used for covering the low part of trunks). Although many farmers mentioned this type of expenditure, the average is very low. The most purchased input is copper sulphate for spraying the vines, followed by insecticides against the Colorado potato beetle. Other, less frequent exits are veterinary controls for cows (by farmers engaged in marketing of milk and dairy products), fungicides, and medicines against poultry lice. Water expenditures refer mostly to the cost of watering house plots, apart from two farmers who use fuel for activating a pump to irrigate their arable land. Most farmers water only in summer, using either the well or the supply network, if available. In many villages, there are no counters and people pay network water based simply on family size; as for well water, most interviewees extract it using a pulley, while ten families own an electric pump and pay for electricity. Finally, farmers who mentioned expenditure for animals had purchased piglets, chicks, ducklings, or small geese; however, most people grow their own poultry by either making them brood their eggs, or using electric incubators, which, based on the author's observation, are available also in small village shops.

A last type of expenditure, comparable to mechanization costs, although much less consistent (4.2% on average), are transport costs, born by 46.9% of interviewees. Most farmers pay contractors for transporting grapes and corn, but also alfalfa, cereals, and sunflower. Overall, interviewees reported 40 cases (75.5% of payers) when a truck is used, 20 (37.7%) when the products are transported within the boot of a car, or by connecting a cart to it, ten (18.9%) when people opted for an animal wagon, and 5 (9.4%) when the cart is connected to the tractor. Users pay a fixed sum for each journey, which is lowest for animal wagons (50-100 MDL) and highest for trucks (up to 300 MDL). Hence, the elderly and, in general, poor families tend to rely on wagon owners, e.g. for taking home the hay for animals.

**Table 11. Expenditure for farm inputs among interviewed farming, by input category.**

| Farm inputs (113 farms) | Cost (MDL) (c) | | Share on total (%) | | Farms (d) |
|---|---|---|---|---|---|
| | average | median | average | median | |
| Animal feed and animals | 1,351 | 50 | 16.68 | 0.89 | 57 |
| Seeds and seedlings | 2,672 | 300 | 11.48 | 7.89 | 97 |
| Fertilizers | 1,454 | 0 | 2.69 | 0.00 | 28 |
| Pesticides | 1,048 | 120 | 5.91 | 2.13 | 88 |
| Water and electricity (a) | 1,062 | 0 | 5.05 | 0.00 | 52 |
| Mechanization services (b) | 5,487 | 2,170 | 41.80 | 43.98 | 109 |
| Transport | 520 | 0 | 4.19 | 0.00 | 53 |
| Labour | 1,458 | 400 | 12.20 | 5.81 | 77 |

Source: Author's survey (Spring 2015). (a) Includes the cost of electricity for running the pump; (b) Includes the costs of fuel and of maintenance for owners of agricultural equipment; (c) Calculated among all farmers (113 cases); (d) Number of farms bearing that cost.

Labour statistics deserve a focus due to their key role for the development of the country. Indeed, being relatively rich in labour, Moldova has to rely on this input. Nevertheless, data on agricultural labour are poor: even the *Small Producers'* survey by the NBS avoids addressing this issue. The author's survey tried to look for inefficiencies by decomposing labour use across agricultural tasks; aggregate figures are displayed in Table 12. First, animal care is clearly the most labour-demanding activity: farmers consecrate to it 3.3 hours a week on average (the median is two hours), relying almost exclusively on family labour. Farmers perform all tasks (including milking and cleaning up henhouses, stables, barns, and pigsties) by hand, as no one owns a milking machine or any mechanical equipment. Second, the list is long but not exhaustive, due also to the unclear separation between the family and the farm. The so-called Z-goods, like collecting wood for warming the house in winter, crushing the walnuts for extracting the kernel, monitoring greenhouses in the countryside, selling the products at the market, etc., are included in the residual category for the few farmers who spontaneously mentioned them, but the list is potentially unlimited. As for strictly agricultural tasks, "ploughing" refers to the tillage of arable land, while "hoeing" indicates a similar task performed in the house plot and vineyards, using a hoe or the rototiller; "grass collection" refers to the collection of hay from fallow lands, or from the village grazing land, in order to feed the animals. Excluding Z-goods and animal care (3.3

hours correspond to 21.5 working days a year), it emerges that weeding is the most time-demanding task, followed by harvesting (which does not include grape harvesting). Indeed, 72.2% of farmers weed exclusively by hand; the same figure is 61.7% for harvesting. In order to meet the high labour requirement of these tasks, 20.9% and 37.4% of respondents respectively carry out exchange of labour (labour input of family members residing outside the village is accounted for as family labour); even the number of hired working days reaches the highest value for these tasks (together with animal care, since a farm hires a full-time worker). Grape harvesting and pruning, which includes both fruit trees and vines, are carried out exclusively by hand. The share of families carrying out exchange of work is highest (45.6%) for grape harvesting, while family members prune mostly by themselves. As for seeding, the number of farmers which do it exclusively by hand or by machine is limited, since farmers prefer the first option in house plots and small shares, the second one in the big share and for some crops cultivated in the small share (sunflowers, corn), if the land size is large. There is a limited possibility for labour exchange, as seeding takes place little by little; the same applies to harvesting of vegetables, and for grass collection. Finally, not surprising, almost all farmers plough by machine and, therefore, the largest share of labour input is hired, and its amount limited. Instead, the relatively high share of farmers that hoe by rototiller (23.6%) is due to the large size of house plots, especially in older, isolated villages. Finally, the questionnaire did not include specific questions on the division of tasks among family members; however, some interviewees provided additional information. If three generations are living together, old women are usually taking care of the poultry and feeding other animals during the day. Wives are responsible of selling farm output at the market; husbands hoe large plots and prune vines and trees; and the entire family, including relatives from the city and children, performs weeding, harvesting, and especially grape harvesting.

**Table 12. Labour input among interviewed farming families, by agricultural task and type of labour.**

| Agricultural tasks | Farmers (total 115) | Total | | Family | | Hired | Exchange | | Hand (d) | Machine (e) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | mean | median | mean | median | mean | mean | % (c) | | |
| Ploughing (a) | 106 | 1.7 | 1.0 | 0.5 | 0.0 | 1.1 | 0.0 | 0.00 | 0.94 | 99.06 |
| Hoeing | 106 | 5.7 | 3.0 | 4.8 | 3.0 | 0.6 | 0.3 | 5.66 | 50.00 | 23.58 |
| Seeding | 115 | 7.6 | 5.0 | 6.1 | 4.0 | 1.4 | 0.0 | 2.61 | 15.65 | 8.70 |
| Weeding | 115 | 20.5 | 15.0 | 15.0 | 12.0 | 3.1 | 2.5 | 20.87 | 72.17 | 6.09 |
| Pruning | 99 | 4.2 | 3.0 | 3.6 | 2.0 | 0.3 | 0.3 | 9.09 | 100.00 | 0.00 |
| Harvesting | 115 | 18.7 | 13.0 | 11.4 | 8.0 | 3.5 | 3.7 | 37.39 | 61.74 | 2.61 |
| Grape harvesting | 90 | 5.9 | 5.0 | 3.5 | 2.0 | 0.5 | 1.9 | 45.56 | 100.00 | 0.00 |
| Grass collection | 52 | 7.4 | 5.0 | 6.6 | 5.0 | 0.5 | 0.3 | 3.85 | 96.15 | 3.85 |
| Animal care (b) | 109 | 3.3 | 2.0 | 2.8 | 2.0 | 3.3 | 0.0 | 0.92 | 100.00 | 0.00 |
| Other | 5 | 20.4 | 4.0 | 10.4 | 0.0 | 10.0 | 0.0 | 0.00 | 60.00 | 40.00 |

Source: Author's survey (Spring 2015). (a) All tasks: days a year; (b) Hours a week; (c) Share of farms carrying out exchange of work (%); (d) Share of farms performing that task exclusively by hand (%); (e) Share of farms performing that task exclusively by machine (%).

This paragraph showed that Moldovan family farms products an extremely differentiated output, which includes both agricultural and animal products. In order to do so, they use their house plots, small shares and, if they do not lease it, the big share. The house plot is used for growing vegetables, while the small share includes both vineyards and cornfields, which together represent more than half of the average farm surface; the big share is usually devoted to cereals and industrial crops. Self-produced corn is used for feeding the animals. In order to get agricultural output, farmers must purchase several inputs, of which the most expensive are mechanization services, since most of them do not own any agricultural equipment. This circumstance, together with the lack of irrigation facilities, makes farming big shares unprofitable in most cases. In order to overcome these constraints, farmers rely on labour-intensive production strategies, replacing mechanization with family labour, e.g. for weeding or for harvesting grapes and corn. Moreover, thanks to the exchange of labour, they can overcome seasonal labour shortfalls. Small investments (incubator) and territorial specialization relying on the Soviet legacy (Trușeni) are successful strategies for achieving resilience.

### 4.4.6. Farm Output and its use: Between Subsistence and Commercialization

The present section focuses on the use of farm output. Vegetal and animal production may be used unprocessed or after processing. The family, including members who moved to the cities, consumes the largest share; another share is sold; a third share is given as a present to relatives and friends, including guests; and a fourth share is used as an intermediate farm input (e.g. animal feed or seeds). Sales may take place through different channels.

Moldovan families use vegetal and animal output for obtaining both unprocessed and processed food. From fruits, they produce *kompot* (a non-alcoholic drink obtained by boiling them in a large amount of water with sugar), marmalade, jam, and fruit wine (usually from apples). Grapes are always processed for obtaining wine (a fundamental product for Moldovan families, especially in the centre). It can be easily sold, and it is not uncommon to increase the level of alcohol, or to produce more wine, by adding sugar. By making either fruits or grapes ferment, farmers obtain spirits (*ţuică*), that usually replace wine in the North of the country. Vegetables (mostly cucumbers, cabbage and tomatoes, but also watermelons) can be pickled or in-brine[16]. Obviously, wheat and corn can be used for producing flour, and sunflower seeds for obtaining oil, but this kind of processing, apart from corn, is not taking place at home: farmers pay for it. As for animal outputs, households use cow milk for obtaining cheese (with or without rennet), sour cream, kefir (a fermented milk drink), and butter. Goat milk can be drunk or processed for obtaining cheese, often mixing it with sheep milk, while the latter is only used for producing cheese. Meat (including poultry meat) may be canned or used for making different types of sausages, while an important derivate of pork is lard. Other animal products are honey and wax from bees, sheep wool, nutria fur, and silkworm cocoons. However, the last ones were produced in the past and no example was found during the survey; as for nutrias, the few farmers raising them are not selling their fur due to lack of demand; also the demand for sheep wool is limited, and many sheep owners simply burn it.

**Table 13. Use of vegetal output among interviewed farming families, by category of vegetal output.**

| Product(s) | (a) | Average shares by use (%) | | | | Sellers | Sellers (%) | (b) |
|---|---|---|---|---|---|---|---|---|
| | | Self-c. | Sales | Feed | Present | | | |
| Wheat | 24 | 57.87 | 17.44 | 22.36 | 2.33 | 7 | 29.17 | 59.78 |
| Corn | 103 | 7.86 | 4.78 | 83.77 | 3.59 | 9 | 8.74 | 54.67 |
| Other cereals | 21 | 5.00 | 0.00 | 90.00 | 5.00 | 0 | 0.00 | - |
| Industrial and feed plants | 45 | 32.83 | 30.35 | 36.00 | 0.82 | 19 | 42.22 | 71.89 |
| Beans, peas, etc. | 81 | 89.25 | 4.81 | 2.47 | 3.47 | 6 | 7.41 | 65.00 |
| Potatoes, carrots | 111 | 89.56 | 6.93 | 0.31 | 3.20 | 10 | 9.01 | 76.93 |
| Onions, garlic | 102 | 92.34 | 5.08 | 0.00 | 2.57 | 8 | 7.84 | 64.79 |
| Tomatoes, cucumbers | 104 | 93.32 | 3.94 | 0.08 | 2.66 | 6 | 5.77 | 68.33 |
| Other vegetables | 89 | 94.78 | 0.96 | 0.56 | 3.70 | 3 | 3.37 | 28.47 |
| Watermelons, melons, pumpkins | 63 | 77.54 | 0.00 | 19.37 | 3.10 | 0 | 0.00 | - |
| Apples, pears, plums | 98 | 94.41 | 2.86 | 0.00 | 2.73 | 4 | 4.08 | 70.06 |
| Cherries, black cherries | 94 | 95.59 | 2.02 | 0.00 | 2.39 | 3 | 3.19 | 63.26 |
| Apricots, peaches | 96 | 96.91 | 1.11 | 0.00 | 1.98 | 2 | 2.08 | 53.34 |
| Walnuts | 83 | 66.02 | 32.22 | 0.00 | 1.76 | 44 | 53.01 | 60.79 |
| Strawberries and berries | 50 | 89.95 | 9.25 | 0.00 | 0.80 | 6 | 12.00 | 77.10 |
| Grape (only unprocessed) | 94 | 93.98 | 5.38 | 0.00 | 0.64 | 9 | 9.57 | 56.20 |
| Other | 9 | 88.89 | 11.11 | 0.00 | 0.00 | 1 | 11.11 | 100.00 |
| Wine | 86 | 65.52 | 30.66 | 0.00 | 3.82 | 44 | 51.16 | 59.93 |
| Liquors and spirits | 12 | 86.31 | 13.10 | 0.00 | 0.60 | 3 | 25.00 | 52.38 |

Source: Author's survey (Spring 2015). (a) Number of farms that cultivate or produce that product(s) (out of 118); (b) Average share sold (%) by selling farms.

Most of these transformation processes are aimed at storing farm products for the winter. Indeed, although in 2014, 90% of the households in rural areas owned a refrigerator (up from 68% in 2006), most families store their products in the cellar, which is usually built underground. Due to the specific Moldovan weather conditions, and to the high customs, price volatility for fresh seasonal products, provided that they are available, is very large. The

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[16] In Moldova is much more common to make vegetables and fruit ferment in brine with herbs, without vinegar ("*murături*").

cellar allows families to have vegetal products in winter without drawing upon expensive imported food. Among stored products, are pickles, marinated vegetables, apples, *kompot*, jam, spirits, wine, tubers (potatoes, carrots, and beet), onions, and garlic. As for animal products, slaughtering the pig provides a large amount of meat and lard, while poultry animals, apart from a few aimed at producing eggs, are often killed in autumn, and their meat canned and stored in the cellar in order to reduce feed expenditures. Eggs can also be stored for a long time, while Moldovans use to consume cheese fresh, without making it undergo maturation. The issue of storage is important, as improper storing conditions may compromise food quality and cause even serious health problems to family members. Also market-oriented family farms are concerned, as, due to the lack of refrigerators, they are forced to sell their products during the peak season. Vegetable processing may play an additional role apart from storage: increasing their value added. An old farmer from Trușeni, who is selling them at the Chișinău market, decided to prepare them in-brine for increasing her earnings.

Before pre-testing, a more detailed table on processed products was included in the questionnaire. However, since this section resulted too long a tedious, only a short list was kept. Out of 118 interviewees who filled the related table, 86 (72.9%) make wine (91.5% of grape producers), 12 (10.2%) liquors and spirits, 51 (43.2%) *kompot*, and 44 (37.3%) jam or marmalade. No family sells *kompot* or jam, and only three sell spirits (made with either apples or wine). However, six families declared that they give a part of their *kompot* (between 20% and 50% of their production) as a present, while four are giving a part of their jam (between 10% and 20%) as a present.

Table 13 reports, for every single vegetal product, or category of products, the average share that is either self-consumed, marketed, used as animal feed, or given as a present by interviewed farmers. The latter share is probably underestimated, since farmers have difficulties in recalling their exits, especially if they took place little by little, like presents. The same argument applies to the share of output used as animal feed, since most farmers give spoiled products (e.g. fruit, potatoes, etc.) to their animals. Moreover, the share stored in order to have seeds for the following agricultural season is not registered. Instead, total quantities, especially sales, are more precise, unless interviewees hided the real values. Differences between products emerge clearly: fruits, vegetables, beans and potatoes are mainly self-consumed; wine and walnuts are relatively more marketable; wheat and industrial crops occupy a mid-position; and other cereals are used as animal feed. Wine and walnuts play a key role for subsistence farmers, since vineyards and walnut trees are widespread; this relatively high supply meets a relatively high demand, so that more than 50% of producers market them. The price of homemade wine is around 10 MDL a litre all over the country; many farmers take advantage of the presence of drunkards in the villages for selling them low quality wine made with sugar. Walnuts can be freely exported to the EU markets; hence, local collection points pay walnut kernel over 100 MDL/kg, which allows the elderly to earn sums close to the value of their pension. Corn and barley are the most common animal feed, followed by fodder beet, the husk of sunflower seeds, wheat, and watermelons. Sunflower seeds and wheat seems to be quite marketable, but families often need the latter in order to prepare homemade bread and cakes. The relatively high share of potato sellers is due to specialization in the northern village of Corjeuți. Finally, farmers use to give as a present wine, vegetables, beans, but also corn (probably to animal owners).

Due to the important role of wine for social appraisal and self-regarding, and to the fact that it is stored in barrels, whose capacity is known, farmers engaged in winemaking could quantify their output, and no blanks are observed. Out of 86 producers, the average is 793.6 litres per family (the median, 700 litres); the figure per family member is 284.7 litres (the median, 212.5 litres); this corresponds to 169.5 litres per person if all sample families are included.

Table 14 focuses on animal output different from unprocessed meat. Differently from vegetal products, interviewers did not ask farmers which share they gave as a present, but only if they did donate some: the result shows that, for most products, more than half of the farmers gave some to friends, neighbour or relatives. It emerges also that animal products are more marketable than vegetal ones, especially cow milk and dairy products: over 80% of producers sell the latter, selling more than 50% of the total on average. As for sheep and goat cheese, they are more profitable, but the number of sellers is only 43.8%, due to the limited number of animals owned by respondents (with a few exception) and their lower productivity. It is worth pointing out that the share of milk that is not sold

is used both for self-consumption (cow milk) and for producing dairy products. Honey is also marketable, and allows producers to obtain a good profit, but the number of producers is limited. Instead, half of the producers of sheep wool (all from Găgăuzia) sell it, but the corresponding earning is very tiny. Products from processing the pig, and eggs, are mostly used for self-consumption, and eventually sold. Indeed, almost all families grow some poultry and, hence, have fresh eggs, but due to widespread ownership, it is difficult to market them: e.g. two cow breeders explained that they eventually bring a few eggs to the open-air market when they go to sell milk and dairy products.

**Table 14. Use of animal output among interviewed farming families, by category of animal output.**

| Product(s) | (a) | Present (b) | Sellers (%) | Share sold (c) | Share sold (d) | Median price (MDL) |
|---|---|---|---|---|---|---|
| Sausages and lard | 32 | 31.25 | 9.38 | 3.65 | 38.89 | 40.00 (kg) |
| Unprocessed cow milk | 35 | 48.57 | 74.29 | 30.87 | 46.98 | 5.00 (l) |
| Cow cheese (all types) | 34 | 58.82 | 82.35 | 53.08 | 64.45 | 35.00 (kg) |
| Sour cream | 21 | 61.90 | 80.95 | 58.59 | 72.37 | 30.00 (kg) |
| Sheep wool | 8 | 0.00 | 50.00 | 50.00 | 100.00 | 6.00 (kg) |
| Unprocessed sheep and goat milk | 25 | 20.00 | 0.00 | 0.00 | - | - |
| Sheep and goat cheese | 24 | 45.83 | 45.83 | 21.23 | 46.31 | 60.00 (kg) |
| Eggs | 113 | 57.52 | 41.59 | 12.50 | 30.06 | 1.00 (piece) |
| Honey | 4 | 100.00 | 50.00 | 35.00 | 70.00 | 52.50 (kg) |
| Other (canned meat, pâté, wax) | 18 | 27.78 | 40.00 | 19.44 | 58.33 | 40.00 (kg) |

Source: Author's survey (Spring 2015). (a) Number of farms producing that product(s) (out of 118); (b) Farms giving some as a present (%); (c) Average share sold by farms, among all farms (%); (d) Average share sold by sellers (%).

Information on unprocessed meat and living animals is reported in Table 15. The gap between investment and ordinary animals emerges clearly: the average number of rabbits and poultry animals killed yearly by family farms is consistent, but respondents use the meat almost exclusively for self-consumption. As for pigs, the 17.1% share of sold animals is due to a large number of farms slaughtering a pig a year (or every two years) for self-consumption, and three farms slaughtering tens of them for selling purposes; instead, a large number of piglets are sold alive. Sheep and goats are rarely slaughtered, but lambs and kids are; since the number of goats owned by interviewees is limited, in most cases their kids are consumed by the family, while the surplus of lambs allows farmers to sell them. Finally, horses and cows are not aimed at being slaughtered, unless they become old. Only one farmer was forced to slaughter and sell her two cows in order to pay for health care. The situation is different as for calves: since they have a high value added and their meat overcomes family needs, farmers sell them, either slaughtered or alive. Overall, sample farms are too small to engage in the market of living animals. However, it is worth mentioning two cases, one successful and one unsuccessful. On the one hand, a farmer from Clișova bought a small electric incubator that allows him to grow chicks, ducklings, and small geese for marketing purposes with a limited expenditure: all 180 geese, and 300 chickens, were sold by him. On the other hand, a young family from Cişmea started raising many pigs: they had to pay and to give board and lodging to a full-time worker for an entire year (the only case in the sample), but when they sold the pigs, they accumulated a big loss due to the drop of prices.

**Table 15. Consumption and sales of animals among interviewed farming families, by animal type.**

| Meat type | (a) | (b) | Share sold (c) | Alive (d) | |
|---|---|---|---|---|---|
| Cows (beef) | 10 | 1.70 | 75.00 | 6 | Source: Author's survey (Spring 2015). |
| Sheep (mutton) | 10 | 5.20 | 25.67 | 0 | (a) Number of farms that obtained any |
| Goats | 5 | 2.00 | 0.00 | 2 | output (meat or alive) from that animal |
| Pigs (pork) | 56 | 1.73 | 17.10 | 51 | (out of 118); (b) Number of slaughtered |
| Chickens | 103 | 36.53 | 0.28 | 306 | animals per producing farm (previous |
| Ducks | 67 | 23.49 | 0.75 | 0 | column); (c) Average share of slaugh- |
| Geese | 26 | 17.15 | 0.00 | 180 | tered animals sold (%); (d) Number of |
| Turkeys, pigeons | 13 | 14.92 | 7.69 | 11 | animals sold alive by all farms (total). |
| Rabbits | 38 | 30.97 | 2.37 | 0 | |
| Horses | 3 | 0.67 | 100.00 | 1 | |
| Nutrias | 2 | 3.50 | 0.00 | 0 | |

The analysis of farmers' motivations highlighted that many of them produce also for feeding family members who moved to towns or to the capital (e.g. university students), even if these supplies are not significantly necessary for the survival of the latter. This is consistent with a process called «ruralisation of the cities» (Piras 2012, p. 121), observed already in Soviet times: Moldovans, whose culture was relegated in the countryside, keep their habits also in urban areas, rather than assimilating the urban lifestyle. Interviewers asked farmers how often they supply relatives and friends living in urban areas with farm products. Out of 115 respondents, only 15 (13.0%) never give farm products to city dwellers, while a relative majority (30; 26.1%) does it a few times a month, 25 (21.7%) once a month, 24 (20.9%) every week, and 21 (18.3%) less than once a month. This practice is important for both farmers, who increase their self-reward by providing homemade food, and urban dwellers, who limit their food expenditures and can eventually offer "real" food and wine to their guests. As explained in details in the next chapter, food security is usually more severe close to the capital, due to high prices and the smaller agricultural areas of family farms.

Marketization of farm output takes place through diverse channels, depending on farm location and the specific product. One hundred and nine farmers answered the relative question, selecting a maximum of four options: 14 of them (12.8%) are not engaged in market transaction. The most common procedure is that people interested in farm products look for the farmer at home (57 cases; 52.3%); a large number of producers either propose their products to potential buyers by going to their homes or take them to a person who then sells them (30 cases each; 27.5%). A smaller number of farmers either have a space in the open-air market (15; 13.8%) or brings them to a business (12; 11.0%). Only in seven cases (6.4%), a business is collecting the output at the farm gate. Forty-two farmers (38.5%) combine more than one strategy, usually home sales for small surpluses, whose buyers are friends and neighbours, and another for commercial crops (cereals, industrial plants, milk and dairy, greenhouse vegetables and fruits, etc.). Interviewers had the possibility to observe some interesting examples during their visits to the villages. In Clișova, a State firm entrusted a local enterprising farmer with creating a local collection point for cow milk, which is then taken to the city, thus overcoming the problem of supply fragmentation. Families owning one or two cows use to deliver their surplus milk early in the morning. As for walnut kernel, district towns are plenty of advertisements by small business interested in buying it. Moreover, it is common to deliver limited quantities of output to small village shops, whose managers take care of selling them; however, in case of controls, the latter risk a fine due to the lack of sanitary certificates. As mentioned above, a number of milk and dairy producers have a space in open-air markets, but occasional sellers can arrange an informal space near the market space in order to sell small surpluses; a honey producer was even going around the market with a trolley for proposing his products. Finally, since storage facilities are missing, larger firms collect cereals and industrial crops just after the harvest, by using trucks.

Differently from sales, farmers had more difficulties in assessing their total output, especially of vegetables and fruits, since they are collected little by little, based on family needs, or when they are ripe. In this case, they were asked whether vegetable production (legumes, potatoes, carrots, onions, garlic, tomatoes, cucumbers, etc.) had been enough for the entire agricultural year. Twenty-seven interviewees answered this question: for 17 of them, backyard products were sufficient; the other ones pointed out to a deficit of some. In particular, Moldovan farmers are almost totally self-sufficient as for onion, garlic, carrots and other roots, while they confront with a deficit of tomatoes and cucumbers, also due to storage problems. Fruits are overabundant due to both a surplus of orchards from the Soviet period and the secondary role they play in the national diet. Finally, many small farmers abstain from growing potatoes due to the large diffusion of the Colorado potato beetles, which implies consistent expenditure for insecticides.

Based on the information collected through the survey, it was possible to calculate the approximate farm profit for 113 out of 126 family farms. Farm entries include the income from selling vegetal and animal output, the money value of self-consumed products[17], and the land rent; eventual earnings from the provision of mechanization services to fellow farmers are not included. Farm exits include the expenditure for variable inputs (seeds, animal feed,

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[17] The value of the corn used as animal feed, of processed milk, and of other farm products used as intermediate inputs is not considered.

water, fertilizers, etc.), that for mechanization services, labour costs[18], land rent costs, and taxes. Overall, two families, including a young one, which had started from less than two years, accumulated a loss. The average profit is 51,665 MDL, the median 42,004 MDL; per capita values are much lower: 17,689 MDL and 14,323 MDL respectively. Using the NBS living minimum for villages in the first semester of 2015, 38 farms (33.6%) earn a profit that, alone, allows them to overcome this sum; however, it is earnt mostly in kind. Synthetic indexes of farm-level figures are in Table 16.

This section described how Moldovan family farms use their vegetal and animal output for obtaining monetary of in-kind income. Most products are processed at home, either for transforming them into food and drinks, or for storing them for winter. Wine is a fundamental product from the social point of view, but it also allows several farmers to get a consistent monetary income. Milk and dairy products are the marketable good *par excellence*; hence, cows are an investment. Fruits are relatively abundant, but they play a secondary role. Vegetables, beans, potatoes, on one side, poultry animals (i.e. meat and eggs), on the other, are the cornerstone of family subsistence. Walnuts, due to a favourable juncture, became an attracting investment and a source of income for the poorest. Overall, farm income is positive for the large majority of families, but due to high mechanization costs and decreasing returns, it is difficult to make successful investments. Indeed, cereals and industrial crops are secondary for family farms, the only exception being corn used for feeding animals.

**Table 16. Synthetic indexes of farm output, expenditures and profit among interviewed farming families.**

| Index | Vegetal output (MDL) | | | Animal output (MDL) | | | Total output (MDL) | | |
|---|---|---|---|---|---|---|---|---|---|
| (113 farms) | Total | money | in kind | Total | money | in kind | Total | money | in kind |
| Mean value | 40,735 | 16,582 | 24,153 | 27,112 | 9,204 | 17,756 | 67,847 | 25,786 | 41,909 |
| Minimum | 2,344 | 0 | 2,159 | 0 | 0 | 0 | 4,059 | 0 | 2,259 |
| First quartile | 14,219 | 799 | 11,233 | 9,400 | 0 | 7,977 | 26,421 | 2,941 | 20,381 |
| Median | 27,042 | 4,199 | 17,399 | 19,025 | 1,010 | 14,000 | 53,426 | 11,688 | 32,043 |
| Third quartile | 45,702 | 16,000 | 30,317 | 36,968 | 11,250 | 25,297 | 90,788 | 28,753 | 54,360 |
| Maximum | 266,927 | 210,072 | 263,477 | 189,873 | 76,650 | 113,223 | 316,979 | 212,054 | 280,677 |

| Index | Farm exits (MDL) | | | | | | Farm profit or loss (MDL) | | |
|---|---|---|---|---|---|---|---|---|---|
| (113 farms) | Total | var. (a) | mec. (b) | taxes | lab.(c) | rent (d) | Total | p.c. (e) | money (f) |
| Mean value | 16,182 | 9,928 | 3,798 | 474 | 1,933 | 55 | 51,665 | 17,689 | 9,604 |
| Minimum | -4,666 | 0 | 0 | 0 | 0 | 47,925 | -106,436 | -49,280 | -184,900 |
| First quartile | 2,220 | 932 | 695 | 33 | 300 | 0 | 19,913 | 8,792 | -511 |
| Median | 4,623 | 2,025 | 1,775 | 150 | 900 | 0 | 42,004 | 14,323 | 5,191 |
| Third quartile | 13,518 | 5,379 | 5,003 | 600 | 1,800 | -1,251 | 74,341 | 23,071 | 16,370 |
| Maximum | 257,281 | 168,100 | 46,500 | 4,085 | 27,200 | -7,736 | 266,335 | 88,778 | 122,966 |

(a) Variable inputs (question XXI); (b) Expenditure for mechanization services (from question XX); (c) Labour costs (question XVIII); (d) Net costs for leasing and renting-in land (at village prices); (e) Farm profit per family member; (f) Excluding subsistence.

### 4.4.7. Monetary Fluxes: Loans, Investments and Taxation

Family farms have to confront a tight credit constraint. Formal credits are barely accessible to them, so that they have to rely on informal, short-term loans. Alternative sources of money are urban salaries and remittances. Moreover, small farms have almost no relations with State institutions, either as taxpayers (apart from the land tax), or as recipients of loans and subsidies. As for local institutions, the owners of animals different from poultry have to pay them the grazing tax. The situation is different for larger farmers, who have access also to international loans.

According to Moroz *et al.* (2015), although agricultural lending increased in the last years, small family farms have limited access to credit sources for three main reasons. First, they lack sufficient collateral options apart from the land, since banks formulate excessive requests and tend to undervalue given items; then, the supply of loans is limited almost exclusively to short-term ones; finally, there is a lack of instruments to facilitate access to credits, like guarantee funds. The survey revealed that interest rates are high, amounting to 15-20% annually, although the official inflation rate was below 5% in 2014. After last year, due to the crisis of the Russian rouble, inflation raised again and interest rates grew. The big farmer from Criuleni district, interviewed by the author, could still negotiate a bank

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[18] The opportunity cost of family labour is not considered; therefore, families who use almost exclusively their labour have lower farm costs.

loan with 16% interest rate. Instead, small farmers, if loans are available at all, pay over 20% for bank loans and up to 30% when, due to lack of collaterals or of transport means, they have to rely on credits from local agencies. One of such institutions is the limited company Association of Economies and Credit "Victory", based in the large village of Sărătenii Vechi, in the district of Teleneşti. Based on the interview carried out in spring 2015, a group of citizens decided to put together their financial resources and created this association in 2000. Similar associations can be found in Chiţcanii Vechi and Brânzenii Vechi, in the same district; in past years there were more, but most of them ceased their activity; hence, it has costumers also in nearby villages. This association grants credits to farmers who cannot get to town and do not own any relevant collateral for receive a credit from a bank. The maximum grantable sum is 25,000 MDL, while there is no lower limit. The average conceded loan amounts to 10,000 MDL. In April 2015, the association granted loans for a total amount of 400,000 MDL, in May, for 200,000. Short-term loans are conceded for a period of one year, long-term ones for two. Interests must be paid back monthly, while the capital can be returned when it is more convenient to borrowers (within one or two years). In spring 2015, the interest rate was 31% a year. Not everyone can receive a loan: once farmers fill the request, the association evaluates it, together with a representative of the private bank that provides the money and, thus, takes the final decision. The association increases the interest rate requested by the bank, in order to pay its expenditures. Usually, farmers give their land as a collateral; however, only a farmer has failed to return the loan since 2000. The number of denials is limited (one out of 50 in 2015): indeed, villagers know each other and can easily judge who is not able to return the loan. This short description showed that farms have difficulties even in paying for mechanization services and seeds. Hence, they need to apply for small credits at the beginning of the season, and return them after harvesting, provided that the weather is favourable. However, the risk is high (losing the only asset they own: land), as are interest rates.

Apart from the formal loans described above, provision of private short-term loans is also common. Local large farmers are usually the ones who lend money to smallholders at the beginning of the agricultural season. The latter pay them back once they have sold their output, or at least a part of it. This type of financing seems to be the most important source of credit for small farmers, since it implies no administrative burdens, and low or even no interest rates. According to our interviews, however, this practice creates an uncomfortable moral obligation to keep good relations with the moneylender, who strengthens his position as local "leader". Indeed, if smallholders plan to have their leased land back for farming it, or to lease it to an alternative large farmer, they risk encountering difficulties in getting financed in the future, not mentioning the close relation of the leaders with local institutions. This situation of «interlocked markets» (Ellis 1993, p. 156) perpetrates the situation of subordination of peasant farmers to leaders.

A third option for financing agricultural works is the use of salaries earned off-farm and of remittances. Indeed, even if the value of self-consumed products overcomes monetary expenditure, so that theoretical farm income is positive, families need to obtain some currency in order to pay for farm inputs. Moreover, due to the important role of homemade food for self-regarding and for social appraisal, farmers would potentially choose to produce it even in case farm income is nil or slightly negative. This is coherent with what some farmers told interviewers: that they can keep farming only because they earn some money off-farm, but are not willing to quit agriculture. Overall, 118 farmers answered the questions on remittances and loans. Out of 35 farmers (29.7%) who receive remittances, 22 (62.9%) use them for covering current farm expenditures. Often, remittances are enough to make investments. One farmer from Orhei district had used them for buying ten big shares from fellow villagers in order to plant walnut trees: an operation that required a long time, because of the difficulties in convincing people to sell their land and in finding contiguous plots. A second, young farmer had bought some large agricultural equipment that he used for working his land and for providing mechanization services. As for other forms of financing, only 14 of 118 farmers (11.9%) had received a loan in the 12 months preceding the interview. Their mean farm size is over three times the overall value: 6.82 ha. Seven of them had received a bank loan, averaging 70,286 MDL (from 6,000 to 300,000 MDL). The same number (including one of the former) had received a private loan, averaging 10,567 MDL (from 1,000 to 50,000 MDL). No farmer received donations, while a large farmer (7.17 ha) had received 135,000 MDL as part of a development project funded by Japan. Apart from some minimum standards, in order to apply for international

loans, farmers need to hold the necessary capabilities, which smallholders, especially the elderly, are usually lacking.

As mentioned above, smallholders have limited contacts with State institutions. They pay a small sum for taxes and receive almost no funding, at least as long as funds related to agricultural activity are concerned. Out of 118 respondents to the relative answer, 105 (89.0%) pay the land tax, which is the easiest to collect, since land, differently from income, cannot be hidden. It is calculated based on owned land: as for land shares, farmers pay one MDL/are if the goodness of soil is unknown; otherwise, this value is weighed according to it. Pensioners and disabled people are exempted from the tax on the big share. As for the house plot, the methods of calculation are slightly different and depends on its overall surface (Law No. 1245 of 22.12.1992). Interviewees declared an average cost of 1.53 MDL/are, which is similar to the one detected by the HBS for 2013 (1.55 MDL), while the median one is 1.01 MDL; some tenants pay the tax on the land they lease. A large farmer, asked whether taxation is creating any problem to his business, declared that this cost is secondary. Only eight respondents (6.8%) pay the tax on farm income, whose rate, according to the largest interviewed farmer, is to 3%. Then, only two farmers (1.7%), who produce potatoes, pay the value-added tax on marketed products. The number of farmers who pay the social fund (i.e. pension contributions on agricultural income) is 12 (10.2%); based on the declaration of one of them, the rate is 16%. Finally, seven farmers from the village of Corjeuți declared that they pay a tax of 1,000 MDL on their tractors.

Apart from national taxes, farmers pay two local taxes: the grazing one, based on the number of owned animals, and a duty on the space in the open-air market, in case they sell their output there. Seventeen interviewees engaged in animal breeding (14.4%) pay the grazing tax. As explained above, this is calculated by dividing the costs for the municipality of managing the public grazing land by the number of animals present in the village: the costliest one is the horse (55 MDL a year), followed by the cow (from 24 to 50 MDL, depending on the village, the median being 35 MDL), while goats, and especially sheep, are much less expensive (3-6 MDL). Moreover, farmers must pay and feed the shepherd, who stays with the sheep in the countryside during the warm months: usually, he receives a monthly sum from each family, or a sum proportional to the number of owned sheep. Sixteen farmers (13.6%) had paid the tax for the space in the market at least once during the year. Nine of them own cows, and therefore sell cheese and sour cream. The cost is divided into three parts: a monthly sum for allowing the seller to enter the market area, a daily rent for the selling table, and the cost of the quality analysis of dairy products. Total expenditures amount to 1,500-2,500 MDL for interviewees who go to the market once or twice a week during the whole milking period of the cows. Farmers selling eggs, chicken meat, fruits, vegetables and wine go to the market less regularly.

This section showed that family farms have difficulties in obtaining loans, even when they need just a small sum for paying for variable inputs at the beginning of the year: interest rates are high and they lack sufficient collateral options. Hence, many of them use money earned in the off-farm sector, and remittances. State institutions have limited relation with subsistence smallholders, at least as long as their farming activity is concerned: on the one hand, the only viable tax base is represented by owned land; on the other hand, most of them either lack the capability for applying for funding, or are not eligible for agricultural subsidies, since they have not registered their household.

### 4.4.8. Rural Livelihood Strategies: An Alternative to Urbanization and Migration

This section focuses on important issues concerning family livelihood choices. Indeed, the progressive ageing of the rural population, due to the emigration of the youth, will generate a serious problem of land inheritance when the current owners, who worked in the Soviet collective farms and thus received land shares, die. In order to turn traditional farming into a viable living opportunity for the younger generations, investments in fixed assets are needed. Indeed, a few respondents chose to diversify their farm income by investing on agriculture-related activities.

As already pointed out, farmers are older than the overall population: the average age of the household head in the survey sample is 56.5 years (which is in line with the figure obtained from the HBS sample for 2013), compared to 54.4 for the overall population. Most elderly respondents had already reduced the size of their agricultural activity by selling cows, sheep, horses, and other time-requiring animals, and by leasing or selling a part of the land they used to farm during their adulthood. Farmers whose children stay at home, or work in the capital and come back

home regularly in the weekend represent an exception. In order to have a better picture of the situation, interviewees were asked whether young family members (i.e. their children) are interested in working in farming. Out of 114 respondents to this question, 38.6% answered yes, 61.4% no, revealing the gravity of the phenomenon. However, the number of those who have relatives, different from their children, who can inherit or take care of their land when they want to stop farming, is higher: 47.1% out of 119 respondents. The remaining 52.9% could not name anyone, of whom 10.1% specified that they had no young relatives apart from their children. Four respondents are planning to hand over their land to their grandchildren, meaning that some of the latter are returning to agriculture after their parents moved to the city or to the off-farm sector. Families without children or with young children did not answer the first question, as they already represent the post-Soviet generation that inherited land from their parents. Indeed, it is common among farmers to hand down a part of their land to their children once they get married; however, one of the few young families which was interviewed, and had received it, is leaving this plot fallow due to the lack of both time and local lessees. The problem of land inheritance emerges when farmers are asked whether they are ready to sell their land in case they are offered a good price (based on their personal evaluation). Out of 124 respondents, only 8.9% would agree to sell all their land, while 25.0% would sell only a part of it (usually the big share, if they are leasing it), and 66.1% would not sell any. Many of them (21.8%) have neither a child, nor other relatives currently interested in working in agriculture, meaning that most of this land risks remaining fallow.

Although gratifying and socially recognized, traditional farming alone rarely allows large families to get a decent income, without making any investment. As pointed out by a respondent from Susleni who uses to farm his big share, only off-farm income allows him to cover the expenditures deriving from the use of a large surface of land; hence, he keeps farming it just for love of agriculture. Farmers were thus asked how they would spend a non-repayable loan of 1,000 EUR[19]. If they opted for ordinary expenditures (variable inputs), this can be seen as a proxy of subsistence orientation and financial difficulties; if they mentioned any type of investment, this means that there is an interest in farm modernization and intensification. Out of 114 respondents, 36.0% would use this money for variable inputs. The most mentioned input are seeds (25 farmers; 21.9%), followed by mechanization services (19; 16.7%), irrigation services and fertilizers (5 each; 4.4%) and young animals (two; 1.8%). Pesticides, weed killer, fuel, animal feed, and transport services were mentioned each by a single farmer. As for investments, the most mentioned is the purchase of seedlings for a small orchard, usually walnuts (24; 21.1%), followed by greenhouses (12; 10.5%), small agricultural equipment, in large part rototillers (11; 9.6%), arable land (10; 8.8%), vineyards, high quality seeds, or large animals (seven each; 6.1%), and drop irrigation facilities (five; 4.4%). Two farmers would build a storehouse or buy new barrels. These answers show that there is a widespread interest for small-level farm intensification, while only a few farmers would increase their farm size as a strategy for raising their farm income.

In order to assess whether, in case of no financial constraints, respondents would opt for farm-centred livelihoods or for alternative strategies, interviewers asked them how they would spend a non-repayable loan of 50,000 EUR[20], not being required to invest it in on farm. One hundred and fifteen farmers answered this question, of whom 24 mentioned two options. A relative majority (43 answers; 30.9%) would invest in real estate, slightly less (39; 27.3%) in farming and related activities or in the food industry, 17 (12.2%) would give this money to young family members (either children or grandchildren), 15 (10.8%) would open a business in the non-farm sector, and 25 (18.0%) mentioned a different option. Focusing on real estate investments, 15 respondents (13.9%) would buy an apartment in the city (almost all in Chișinău) for their children or for leasing it to obtain an additional entry: these people do not see a future in farming for the next generation. The remaining ones would stay in the village, but only eight (7.0%) would build a house for their children there, while the remaining 20 (17.4%) would use the money for repairing or finishing their houses. As for alternative uses, five people would leave the money in a bank for maintaining themselves with the interests (which shows how high bank interest are, for the small share of population that can deposit

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[19] Corresponding to 20,143.30 MDL at the average official exchange rate during the period of the author's survey.
[20] Corresponding to 1,007,165.00 MDL at the average official exchange rate during the period of the author's survey.

some money). Another five would use them for health (indeed, sanitary checks and medicines are relatively costly for the poor). Four would travel abroad, three pay for the studies of their children, another three would make donations, and two would pay for weddings or funerals. Farmers that planned to start a business had less clear ideas: some would buy a mean of public transport, some others open a small shop in the village, and the remaining ones would start it in the sector where they work as waged employees. Focusing on farm investments, a large number of farmers would buy agricultural equipment (tractors or combines), coherently with the low level of mechanization. The second largest group would build storage facilities (including refrigerators), since the lack of such assets forces them to sell their output during the peak season, when prices are lower. A third group would focus on permanent crops, either planting orchards (mostly walnuts) or vineyards, or managing a tree nursery. A fourth group mentioned animal farming (cattle, rabbits, and beekeeping) or related services (slaughterhouse, veterinary clinic). Only three people would buy more land; the same number would engage in the food processing industry; and two would open an agritourism.

While carrying out the survey, the author had the opportunity to observe different strategies for increasing farm production. As for farming-centred options, growing higher value added crops, like potatoes, could be a successful choice even with just a few hectares of land, like in the northern village of Corjeuți. Moreover, berries seem to be a quite profitable product category: a middle-sized farmer from Telenești district had just started growing two hectares of blackcurrants, while an old agronomist from Orhei district had used his knowledge for grafting strawberries and gooseberries in his garden, but he has the key advantage of a brook bordering it. A few cases of innovation through differentiation are also observed. One farmer is planning to open a small agritourism; a second one had collected traditional agricultural and everyday life tools and opened a small museum in his house, which is visited also by some classes of pupils; a third one had created a small (one-hectare) lake in his land plot, so that people can pay him for fishing. Although interesting, these experiences are not many, so that rural areas lack income-generating activities different from pure farming, which the youth associate with drudgery and uncertainty.

This paragraph showed that a large majority of farmers want to retain their land for future generations, although the children interested in working full-time in agriculture are much less than they are. A majority of farmers, regardless of land size, would also like to increase their farm production. At this regard, greenhouses, drop irrigation, small equipment (rototiller), and small orchards (especially walnuts) are the most common investments named by poor, subsistence-oriented farmers. If provided with a large non-repayable loan, a significant minority of them would still invest it in farming, and the majority of the latter would opt for intensification rather than growth, either by increasing mechanization or by taking advantage of price variations through storage facilities. Real estate seems an attractive alternative. More than one tenth of the respondents would buy an apartment in the capital for their children, so that they can move there, but a significant number hopes that the youth will build their future in their native village.

# 5. Quantitative Analysis (2006-2013): Land Recipients in Today's Moldova

This chapter aims at describing the main features of Moldovan family farms and their evolution over time, based on the HBS database. The first paragraph analyses some descriptive tables of the sample from 2007 to 2013. Farm households are grouped according to important characteristics: the distance from the centre of the country, the share of marketed production, their land size and, limited to 2013, rural location, poverty level, hiring of farm labour, and family characteristics. In the following paragraph, the focus shifts to the evolution of the same variables over years: the probability of farm growth or shrinkage, and of buying or selling land, given the situation in the previous year, is calculated by means of Markov transition chains, and the determinants of these choices are assesses by means of multinomial logistic regressions. The third paragraph deals with the production side, including a focus on expenditures for farm inputs, and commercialization of farm output by categories and family characteristics. A production function is estimated for both vegetal and animal products, and the determinants of productivity detected. The fourth paragraph focuses on poverty, food safety, life levels, and the impact on them of different livelihood strategies.

Farm and family characteristics seem to be strongly correlated. Farming contributes to reduce poverty, food insecurity and income inequality, and improves the perception of individual life conditions by people performing it. However, its impact on family income is limited: remittances seem to be much more effective in reducing poverty.

## 5.1.    Descriptive Statistics: Family Farms across Land Size, Commercialization and Location

This paragraph illustrates general descriptive statistics for family farms. These are identified here as households farming some land, regardless whether they declared to earn any farm income. Hence, families that lease or abandon all their land are not included. The descriptive Tables report data for three years (2007, 2010, and 2013). This allows readers to perceive the changes that took place all over the period, while excluding years 2009 and 2012, when severe droughts heavily reduced agricultural yields. Each Table contains variables regarding family, poverty, income and farm characteristics. For each year and variable, the average value in the sample is reported; then, farms are grouped according to specific characteristics; average group values are reported and significance of mean differences tested.

The first grouping is based on the size of farmed land. Defining a farm *small* rather than *large* is not a trivial task. Farm profit is subject to strong seasonality, and to yearly weather conditions, and for most farms only one value is available; therefore, it cannot be considered a good indicator of farm size. Household farming less than 0.30 ha are considered *small*: this is the median surface of the small share and the house garden together (both abandoned and farmed), and the cumulate distribution function of farmed land presents a sudden increase after this value. Households farming 1.92 ha of land or more are classified as *large*: this is the median value of the big share, the small share and the house garden together (both farmed and abandoned). Households farming a land area between these values are included in the *mid* category. Small farms use less than a median small share; mid-sized farms use a small share and a portion of a median big share; large farms use a small share and at least an entire median big share.

The second grouping is based on the share of marketed output. Family farms are considered *subsistence* farms if they earn less than 10% of their farm income in money, *semi-commercial* farms otherwise. As pointed out in the third chapter, the NBS subtracts farm expenditures from monetary earnings; hence, they underestimate marketed products in comparison with self-consumed products. Finally, the third grouping is based on location: farms are classified as either central or peripheral according to their distance from Chișinău, adopting a 60 km threshold.

Average values of important variables across farm size are reported in Table 1A. Small farms account for slightly more than half of the total, and their share increases over years, while the share of large farms decreases from 7.5% in 2007, to 5.3% in 2013. However, the average total land area of small farms shrinks over years, while that of large ones increases due to the reduction of their number: probably, many farms which were farming just above 1.92 ha sold a part of their land, leaving only the largest farms in this category. The share of subsistence income decreases with increasing farm size, but poverty incidence does not differ significantly across groups. This probably happens because farmers adapt the size of farmed land to availability of family labour. Indeed, large farms tend to be owned

by larger households, and although total family income is significantly higher for them, the income per equivalent family member does not change much across groups. Apart from family size, other household characteristics vary with farm size. The age of the household head, the share of households headed by women, that of household heads with bad health status, and that of households with a low level of education are all increasing with decreasing farm size. This happens because of the longer life expectancy for women. However, apart from 2013, when households owning larger farms had a bigger share of educated members, this indicator is not significantly different across farm sizes. Underemployment and unemployment are significantly higher for large farm households, probably due to a lower age and a larger family size. This figure shows that, although the share of farm income is much higher for large farms (almost three times in comparison with small ones), this is not enough for granting them a decent livelihood; therefore, at least one family member is forced to look for a job in other sectors. However, the share of households who declared to have difficulties in paying for food is higher among small farmers, while no significant difference across farm sizes is observes as for electricity costs. This happens although the income per equivalent family member and the shares of earned non-farm income are not so different across farm sizes, especially in 2013.

The values of land variables show that family farms are not growing by renting-in land: this category of land is around three percent of the total in all years for large farms, and one percent for middle-sized farms. The difference in farm sizes appears because small and middle-size farms lease around 60-70% of their land, while large ones use almost all the land owned by family members; instead, the difference between the first two categories materializes because the former leave 20-25% of their land fallow, while the latter farm more than 90% of it. As regards mechanization, the number of small and middle-size farmers who own a tractor is negligible, while it varies between 14 and 25% for large ones. It is not possible to verify whether the latter farm more land because they own a tractor, or conversely. Finally, it is worth pointing out that land productivity is between five and six times higher among small farms compared to large ones, and around twice compared to middle-sized ones. This happens because the lack of irrigation facilities, and the low level of mechanization (with the consequent necessity to rely almost exclusively on family labour), impede the use of big shares for cultivating high value-added products. Large plots can be used just for extensive cultivation of cereals and sunflower, while small farmers can cultivate vegetables, potatoes and fruits in the house gardens by extracting water from the well, and grapes or corn for animals in the small share.

In conclusion, older families, oftener led by women or by people with health problems, manage smaller farms, leasing a large portion of their land and leaving another part fallow; farming does not provide a large share of family income, but it is necessary for supplementing poor State transfers. More than one third of small farms are located in urban areas, where farming represents a side activity. On the other hand, big families manage large farms, using almost all their land for cultivating low value-added crops. However, they are not able to make a living from farming and sell a part of their family labour in other economic sectors. They market around one fourth of their production. Although small and middle-sized farms lease an important share of their land, large family farms are not renting it. The only possible explanation is that land is rented by corporate farms, which are not included in the HBS sample.

Table 2A shows farms grouped according to their relation with the market of farm products. About three fourth of farms sell less than 10% of their output. A growing share of them (52-59%) is represented by small farms, while slightly more than 40% of semi-commercial farms are small. Subsistence farms are oftener located in urban areas. Like for small farms, also subsistence ones are managed by smaller families (even if the difference is not so ample), with older heads, oftener women, and oftener with a bad health status. The share of members with a low level of education is larger among small farms, but that of members with high education is not significantly different among groups; also, the prevalence of unemployed and underemployed people is similar. Differently from the farm size, the share of marketed output is correlated with family income. The latter is about 20% higher for semi-commercial farms; this difference is still above 15% when considering income per equivalent family member. However, income composition is very different: while the share of farm income decreases for both groups over years, it is two times higher for semi-commercial farms in 2007, and three times in 2013. At the same time, subsistence farms earn only

5-10% more of their income off-farm, meaning that State transfer are more important for them. They also have slightly more difficulties in paying for food; indeed, poverty incidence is 13-16 points higher among this group.

As for farm variables, a higher farm income seems related to a more efficient use of resources rather than to a larger amount of them: productivity is between two and 0.33 times higher among semi-commercial farms, but they have access to only 20-40% more land, and the number of families owning a tractor ranges between 4 and 7 percent. Differences in land use are not significant: both groups rent in just around 1% of their land, and lease about 30%. Only starting from 2010, subsistence farms leave a larger share of land fallow (17.6%, compared to 14.2%). Finally, the share of marketed production increases over years for semi-commercial farms, reaching 53.9% in 2013.

Within Table 3A, family farms are grouped according to location, either central or peripheral. Around one fourth of all farms in the sample are located within 60 km road distance from the capital. Although not all variables differ significantly between groups in all years, central farms sell a larger part of their output, which shows the importance of Chișinău market as a destination of agricultural products. However, they are also oftener located in urban areas (or better, suburban) and, therefore, have a smaller size: peripheral families own between 1.8 and 2.1 times more land. This gap is reduced because of different land use: central farms lease less than one tenth of their land and then leave around one fourth of the remaining land fallow; their counterparts lease 34-36% and abandon less than 15% of the rest. As a result, central households farm two thirds of their land, peripheral ones just 50%. No difference in the level of tractorization is observed, and land productivity is not diverging significantly. Nevertheless, the share of farm income is 5-8 points higher for peripheral farms, while that of earned off-farm income is 10-15 points higher for central ones. This is due to a very different livelihood strategy. Households residing close to the capital have the opportunity to earn a living in the off-farm sector. Hence, their family incomes are higher by one third to one fifth, depending on years, and incomes per equivalent members higher by 15-21%. The downside is that next to Chișinău also prices are higher; hence, even if poverty is less diffused (the gap decreased from 12.8 to 5.5 points), the share of families declaring difficulties in paying for food or electricity was traditionally higher (the gap closed after 2010).

As for family characteristics, farms close to the capital are manged by slightly larger households with younger, more educated heads, who are oftener looking for a job. This figures, together with the limited incidence of unearned income, confirm that livelihoods in this area are centred on the off-farm sector, favoured by a younger work force.

Limited to 2013, more data are available. They are reported in Table 4A. First of all, farm households are compared to non-farm ones; then, the former are divided according to whether they hire external labour, to family characteristics, and to location. Farm households make up 70.3% of the Moldovan population but, as shown by Map 1, they reach 100% in nine out of 35 districts. These families are larger; their heads are much older (by 7.1 years), and oftener men, with a worse health status, and a much lower level of education (only 19.7% attained high education, compared to 55.3% among non-farmers). Their financial conditions are much worse: family income is 29.0% lower and the income per equivalent member 33.4% lower, so that the prevalence of poverty is threefold; unemployment is not significantly higher, while underemployment is twofold. However, when asked to rate their life conditions, farmers gave more often a positive assessment, and the share of farming families declaring difficulties in paying for food is seven points lower, while for electricity the gap is almost ten points. Obviously, farm variables assume significantly different values: non-farming households own 0.18 hectares of land on average, and lease almost all of it; a small number of them own some poultry animals. As for farmers, their average yearly output at comparable prices is 7,883 MDL (6.6 times the monthly poverty threshold), while they spend 2,903 MDL; 36.4% of their output comes from animals, and only 12.9% of the total is marketed. The average land productivity (excluding animal products) is 16,672 MDL per hectare, while average labour productivity is about 23 MDL per hour.

Dividing farms according to whether they hire external labour gives an idea of the conditions of peasant farms proper according to Chayanov's definition. Only paid labour is considered, while there are not data on exchange of labour. Autarchic farms include, probably, both farms led by pensioners and farms owned by younger families, for which farming is a side activity. These families are larger, with younger (by 4 years) and healthier heads; as for the level of education, labour-hiring farms have bigger shares of both low and highly educated heads. The income of

autarchic families is lower by 8.4%, but due to a larger family size, the income per equivalent member is not significantly different. The income gap derives from the non-farm-centred livelihood strategy of autarchic families: they earn a larger share of income off-farm, and are oftener unemployed or underemployed. However, this strategy results neither in significantly lower poverty incidence, nor in a better-perceived life level, nor in less difficulty in paying for food (11.4 points in favour of hiring farmers) or for electricity (7.3 points). This situation arises from a very different farm profit composition: on average, autarchic families earn 32.6% less, but they spend 51.5% less. Indeed, they use a labour-intensive production scheme, so that land productivity is 1.57 times higher, while labour productivity is less than one tenth compared to labour-hiring farms. This occurs also because the level of mechanization is much lower among autarchic farmers. However, this does not mean that they work more in agriculture: they farm 54.2% less land (mostly due to a large leased share), and grow significantly less animals (apart from cows), whereas labour input is only 19.0% lower. Finally, autarchic families are also marketing a smaller share of their production.

As for location, almost four fifth of the farming population lives in rural areas, and 73.1% in the periphery of the country. In both cases, a lower family and per-equivalent-member income is observed, together with a significantly larger share of farm income and a lower share of earned non-farm income; hence, poverty is more common in both rural and peripheral locations. Understandably, farm areas and the number of animals are significantly bigger in the countryside. At the same time, land productivity is lower and labour productivity higher in comparison to cities.

Grouping farms according to family characteristics helps distinguishing the production strategies adopted during different periods of the family lifespan. Family income is highest for large households (57,810 MDL), followed by those with children, with migrants, young ones, female-headed ones, and low educated ones; apart from poor families, old ones show the lowest incomes (25,650 MDL). Incomes per equivalent member range from 25,484 MDL for families with migrants, to 16,103 MDL for elderly ones, 15,253 MDL for low educated ones, and 9,013 MDL for poor ones. The composition of these incomes varies: agriculture accounts for one fourth among poor families, 21.3% among large ones, 19.6% among those with children, 18.0% among low educated ones, and around 15% among the others. However, the share of income earned off-farm reaches 70% among young families and those with migrants, 60% among large ones and those with children; other groups, especially the elderly, rely strongly on State transfers.

As for farm characteristics, owned land does not vary much depending on family characteristics. Only younger families own less than half the average land area: this is the result of a static land market, where people who worked in farming in USSR and received land shares are still alive and neither sold their land to other families, nor transferred it to their children. However, young farmers lease a smaller amount of land, so that the farmed area, although small, is not so different from other family types. Instead, it is bigger for large families (1.42 times the average), which can provide the necessary labour input, followed by families with migrants (1.16 times), which can replace family labour with mechanization services and other inputs, and pay them with remittances. For the same reasons, large families grow a significantly larger number of animals (cows, pigs and poultry), while young, old, and female-headed ones grow significantly less, since they lack either the expertise, or the force for engaging in such time-demanding activity. Young families and female-headed ones are also using much less labour (about 16 hours per week), large ones the most (around 26), proving that the area of farmed land is adapted to available family labour. Only remittances allow breaking this relation: recipient households are able to farm comparatively more land, and to grow comparatively more poultry, while using a quantity of labour that does not differ significantly from the average.

Farm output differs considerably depending on family characteristics: large households are the most productive, with 12,781 MDL, followed by those with children (10,617 MDL) and those with migrants (8,357 MDL), although the output of the latter is not significantly different from the average. All other household types produce less than the average, the least productive being female-headed (5,171 MDL) and elderly ones (5,470 MDL). Large families, and families with children or with migrants are also spending significantly more than the average; however, families with migrants show the highest ratio between money expenditures and farm production (0.42), demonstrating once again that remittances increase the propensity to spend for services rather than using family labour. On the contrary, young families are able to produce not much less than the average at the minimum cost (1,986 MDL). Indeed, land

productivity is highest for them (21,404 MDL/ha, 28.4% above the average), followed by large families and those with children, while it is lowest for families with migrants (14,109 MDL/ha). On the other hand, labour productivity is above the average (although not significantly) only for the latter, is smallest for the poor (9.0 MDL/hour), and very low for the elderly (10.5 MDL/hour) and for low educated families (11.1 MDL/hour), which suggests that the supposed most conservative groups are not using their labour efficiently.

In conclusion, Moldovan family farms are a very diverse population. Thanks to the equity-driven privatization process, land ownership is not varying much among them: the only difference is due to location and, hence, to total available land and population density. However, land use varies more, depending on family features: large households tend to farm all available land, while elderly ones lease or abandon a larger share of it. Young families found more constraints in accessing land; therefore, they prefer to choose non-farm-centred livelihood strategies. Generally, labour-intensive production practices prevail, especially among families that do not farm their big shares; if they do farm these plots, they can only carry out extensive cultivation of cereals and sunflowers, due to lack of irrigation and a low level of mechanization. Therefore, farm income grows less than proportionally to farmed land, and large farmers have anyway to sell a part of their family labour off-farm. Commercialization of agricultural output is very limited; however, a higher share of monetary farm income seems to be related to more dynamism and efficiency in production, or simply to closeness to cities. Therefore, the most important functions of farming are supplementing the income of vulnerable social groups (especially the elderly) and increasing food security of families by providing fresh, homemade products. Indeed, urbanization seems related to less food security, and even migrants, rather than quitting farming for pursuing a completely different livelihood strategy, use remittances for covering farm exits.

## 5.2.    A Longitudinal Overview: Land Transactions, Market Integration and their Drivers

This paragraph provides an overview of the evolution of Moldovan family farms within the period covered by the HBS sample (2007-2013). Data on households that took part in the panel study are analysed. First, the variables already described in the previous paragraph are observed in a longitudinal perspective. Then, the dynamics of the land market and the resilience of farms that decide to engage in commercial activities are verified through switching probabilities. Finally, the main drivers of these switches are detected. The objective of the paragraph is to understand whether Moldovan family farms are moving in a clear direction. Possible evolutions could be gradual disappearance through sale or desertion of land, further market integration (i.e. transformation of peasants into capitalist farmers), or the emerging of two or more clusters, e.g. part-time, hobby subsistence farmers, and full-time commercial ones.

The number of farm households in the sample decreases over years; however, this is due to a shrinking sample size, so that the share of population living in farming families stays constant, around 69%, after dropping by three points from 2006 to 2007. The share of farms located in urban areas is also almost constant, around 20%; similarly, the number of those located next to Chișinău does not vary much, and they account for a fourth of the total. Instead, the share of small farms increases by five points, from 50% in 2007 to almost 55% three years later, and then stays constant. Subsistence farms peak 78.3% in 2010, but then decrease to 74.1%; instead, the share of self-consumption on farm production is constant, around 88%, apart from 2013, when it drops by two points. The level of mechanization is also constant (between 2 and 2.8% of farms own a tractor), as land productivity, which follows a fluctuating path around 20,000 MDL/ha. Only in 2007, productivity is much higher (28,413 MDL). One possible explanation is that substantial adjustments in data collection techniques were made after the first pilot year, causing a significant drop in farm incomes. The only farm variable that shows a clear decreasing trend is total land: after growing slightly, from 1.57 ha in 2006 to 1.61 ha in 2007, it reduces by 14.1% until 2013. The shares of owned and rented-in land do not change much, meaning that this decrease is due to land sales. Probably, some families are selling the land they used to lease, since the percent of leased land decreases by almost two points. At the same time, the share of fallow land increases by around three points, peaking 17.4% in 2010, and then stays constant. Considering these variations, households use between 53.1% (2009) and 55.4% (2008) of their total land, which means that average farmed land is decreasing over years.

Previous figures prove that farm production strategies do not change much over years. However, the share of farm income on total family income decreases from 21.4% in 2008 (as explained above, 2007 is as an outlier, with 29.4%) to 18.6% in 2013. This happens because of a slight increase of total family income (at constant prices) over years, while farm income stagnates. An exception in the growing trend is 2009, when Moldova experiences the effects of the world economic crisis through a decrease in remittances and the return of unemployed migrants: both total income and farm income drop by around 1,000 MDL in this year. The income per equivalent-family-member increases more than family income: apart from a 5.7% drop between 2008 and 2009, it grows by 17.0% from 2006 to 2013. Hence, the share of poor farm households decreases from 44.0% to 31.1%. This is mostly the effect of a shrinking family size (from 2.7 to 2.5 members). Moreover, farming families become older (the average head age increases by 2.2 years) and the percentage of female heads grows by 4.7 points. The share of families with a low level of education halves, while that of highly educated ones stays constant. Finally, the share of families with unemployment, and especially those with underemployment, drop considerably, with the usual exception of the year of the crisis. Overall, these figures show that, since the number of young families who enter agriculture is very small, farming households are becoming older, and they tend to use a smaller amount of land in order to fulfil their subsistence needs. The share of heads with a low level of education is decreasing, due to the deaths of very old cohorts and the relative increase in the number of farmers who achieved a middle level of education in USSR.

**Table 17. Markov transition probabilities for variation of farmed land (2007-2013).**

| Previous Δ farmed | | Δ farmed | | |
| --- | --- | --- | --- | --- |
| | | - | 0 | + |
| **-** | obs. | 124 | 326 | 233 |
| | exp. | 99.68 | 500.34 | 82.98 |
| | pr. | **0.182** | **0.477** | **0.341** |
| **0** | obs. | 274 | 2,426 | 205 |
| | exp. | 423.96 | 2,128.08 | 352.96 |
| | pr. | **0.094** | **0.835** | **0.071** |
| **+** | obs. | 217 | 335 | 74 |
| | exp. | 91.36 | 458.58 | 76.06 |
| | pr. | **0.347** | **0.535** | **0.118** |
| if $t \to \infty$ | | 0.134 | 0.753 | 0.112 |

Source: Moldova Household Budget Survey.

**Table 18. Markov transition probabilities for variation of available land (2007-2013).**

| Previous Δ available | | Δ available | | |
| --- | --- | --- | --- | --- |
| | | - | 0 | + |
| **-** | obs. | 72 | 275 | 139 |
| | exp. | 44.40 | 400.66 | 40.94 |
| | pr. | **0.148** | **0.566** | **0.286** |
| **0** | obs. | 192 | 2,929 | 173 |
| | exp. | 300.95 | 2,715.56 | 277.50 |
| | pr. | **0.058** | **0.889** | **0.053** |
| **+** | obs. | 121 | 270 | 43 |
| | exp. | 39.65 | 357.79 | 36.56 |
| | pr. | **0.279** | **0.622** | **0.099** |
| if $t \to \infty$ | | 0.082 | 0.843 | 0.075 |

Source: Moldova Household Budget Survey.

Tables 17 and 18 show the probabilities for available land and farmed land to either shrink, grow or stay constant in year $t$ given that they shrank, grew or stayed constant in year $t-1$, and asymptotical switching probabilities. Every internal slot contains observed frequencies, expected ones, and switching probabilities (standardized by row). The sample size is 21,640 for a period of seven years (2007-2013). Obviously, the first transitions are observed for 2008; the number of transitions is, thus, 4,214. First, as expected, available land tends to vary less than farmed land: farmers decide year by year how much land they need to farm, leaving the rest fallow, rather than changing the amount of land which is either leased or rented in. Overall, the probability of staying constant is much higher than that of either shrinking or growing, especially among farms that did not change their land area in previous years. No change in the amount of available land is observed in 69.5% of transitions, and no change in farmed land is observed in 57.6% of the cases. The probability of observing no variation is the highest also among farms that shrank in previous years, and especially among those that grew. Hence, the probability of keeping growing is very low: only 11.8% of the farmers who increased their farmed land will increase it further in the following year, and only 9.9% of those who increased their available land will keep doing so. Therefore, the number of farms that manage to reach a very large size is limited, unless they acquired a big amount of land in a single transaction. On the other hand, also the number of exiting farms is small. Moreover, for both available and farmed land, the probability of either shrinking after growing or growing after shrinking is more than two times higher than the probability of following the same strategy in two consecutive years. Therefore, both decreasing and increasing the farm size are not sustainable strategies

in the long term. Farmers are caught in a sort of poverty trap: they do not have enough resources for turning their farm into a profitable business and, at the same time, they cannot stop farming, as they have to fulfil their survival needs. In the long term, 84.3% of them will keep the same amount of available land, and around three quarters will keep farming the same amount of land.

Tables 19 and 20 focus on farm income. The first one reports the probabilities for the farm profit to be positive or negative (loss) in year *t*, given that it was positive or negative in year *t-1*, and asymptotical switching probabilities. The sample size is 18,804 for a period of seven years (2007-2013); the number of transitions is 17,084. The second Table shows the probability for the farm to intensify production (i.e. increasing the product per unit of farmed land) in year *t*, given that it intensified it in year *t-1*, and asymptotical switching probabilities. The sample size is 8,268 for a period of seven years (2007-2013); the number of transitions is 4,061. First, the number of farms experiencing a loss is smaller than that of farms earning a profit; however, the probability of accumulating losses in consecutive years is high: almost three quarters of farms that experience a loss keep losing the following year, while the probability of losing is only 10.6% for farms that earned a profit. As for productivity, it cannot increase forever, but since the number of observations per farm is limited to a maximum of four, the probability of observing a constant positive trend cannot be excluded. However, sampled farms alternate increases and decreases in their output per farmed hectare: the probability of switching from increase to decrease, or vice versa, is around three fifths. Hence, no group of economically efficient family farms is clearly emerging.

| Table 19. Markov transition probabilities for farm profit or loss (2007-2013). | | | | Table 20. Markov transition probabil. for productivity variation (2007-2013). | | |
|---|---|---|---|---|---|---|
| **Previous farm profit** | **Farm profit** | | | **Previous intensific.** | **Intensification** | |
| | **-** | **+** | | | **-** | **+** |
| obs. | 3,669 | 1,277 | | obs. | 905 | 1,323 |
| **-** exp. | 1,436.26 | 3,509.74 | | **-** exp. | 1,128.54 | 1,099.46 |
| pr. | **0.742** | **0.258** | | pr. | **0.406** | **0.594** |
| obs. | 1,292 | 10,846 | | obs. | 1,152 | 681 |
| **+** exp. | 3,524.74 | 8,613.26 | | **+** exp. | 928.46 | 904.54 |
| pr. | **0.106** | **0.894** | | pr. | **0.629** | **0.372** |
| if $t \to \infty$ | 0.292 | 0.708 | | if $t \to \infty$ | 0.514 | 0.486 |

Source: Household Budget Survey.　　　　Source: Household Budget Survey.

In order to assess the importance of agriculture for family wellbeing, it is important to observe the share of farm income on total family income. Table 21 reports the probabilities for this indicator to switch from a band to another in year *t*, given that it was in a certain band in year *t-1*, and asymptotical switching probabilities. Every internal slot contains the switching probabilities (standardized by row). Even non-farm households are included in the sample, whose size is 18,798 for a period of seven years (2007-2013); the number of transitions is 17,064. Non-farm households have no agricultural income; however, around a quarter of them switches to a positive income, probably using land, which was previously left fallow. Probabilities along the diagonal are relatively higher, meaning that farm income shares tend to stay constant. The situation changes for shares between 50% and 75%: for these farms, the probability of switching to a lower farm income share is higher. Overall, the probability of switching to lower income bands is higher than that of switching to higher ones, meaning family farming is losing economic relevance. In the long term, 75.7% of them converge toward a share of farm income under 25% of family income.

As for the share of marketed output, it is necessary to take HBS figures carefully, since all farm expenditures are subtracted from monetary farm income. Table 22 contains the probabilities for this figure of switching from a band to another in year *t*, given that it was within a certain band in year *t-1*, and the asymptotical switching probabilities. The sample size is 18,798 for a period of seven years (2007-2013); the number of transitions is 13,134. The large number of switches from a marketed share over 50% to zero is due to how the variable is calculated. Overall, farms that do not market any share of their output have the highest probability (81.0%) of staying in this situation; 70.6%

of all transitions start from a situation of subsistence production. Regardless of the share of marketed output in year *t-1*, the probability of selling nothing the following year is the highest. It is above 50% for farms selling less than a quarter of their output and for those selling more than 90%. Only for farmers selling more than half of their output, the probability of keeping selling the same share is over one third. This proves that if a farm is significantly engaged in market activity, the probability of keeping this position is significantly higher than for outsiders. In the long term, 71.0% of farms converge toward subsistence, while 11.0% converge toward a share of marketed output over 50%.

**Table 21. Markov transition probabilities for the share of farm income (2007-2013).**

| Previous farm share | Farm share | | | | | |
|---|---|---|---|---|---|---|
| | **0%** | **0-10%** | **10-25%** | **25-50%** | **50-75%** | **75-100%** |
| 0% | **0.742** | 0.153 | 0.060 | 0.030 | 0.008 | 0.008 |
| 0-10% | 0.201 | **0.426** | 0.239 | 0.090 | 0.026 | 0.018 |
| 10-25% | 0.077 | 0.265 | **0.392** | 0.198 | 0.039 | 0.030 |
| 25-50% | 0.046 | 0.150 | 0.297 | **0.368** | 0.094 | 0.045 |
| 50-75% | 0.044 | 0.106 | 0.168 | **0.352** | 0.230 | 0.100 |
| 75-100% | 0.048 | 0.113 | 0.169 | 0.200 | 0.157 | **0.313** |
| if $t \rightarrow \infty$ | 0.295 | 0.239 | 0.223 | 0.157 | 0.049 | 0.037 |

Source: Moldova Household Budget Survey.

**Table 22. Markov transition probabilities for share of marketed output (2007-2013).**

| Previous market share | Market share | | | | | |
|---|---|---|---|---|---|---|
| | **0%** | **0-25%** | **25-50%** | **50-90%** | **90-100%** | **Total** |
| 0% | **0.810** | 0.073 | 0.052 | 0.037 | 0.028 | 9,294 |
| 0-25% | **0.569** | 0.194 | 0.157 | 0.074 | 0.007 | 1,237 |
| 25-50% | **0.412** | 0.156 | 0.265 | 0.159 | 0.008 | 1,199 |
| 50-90% | **0.358** | 0.089 | 0.190 | **0.346** | 0.017 | 957 |
| 90-100% | **0.548** | 0.022 | 0.020 | 0.038 | **0.371** | 447 |
| Total farms | 9,315 | 1,202 | 1,182 | 973 | 462 | 13,134 |
| if $t \rightarrow \infty$ | 0.710 | 0.091 | 0.089 | 0.074 | 0.036 | |

Source: Moldova Household Budget Survey.

Land variations in the period 2008-2013 are summarized within Table 23. For every year, the number of sample households who took part in the panel study and that of active farms (i.e. farms using some land) are reported. Then, statistics on changes of total available land, farmed land, owned land, farm exits and entries are included. Shrinking farms are those that reduced their available land (by leasing, selling, or less rented-in land) or farmed land (by leaving a larger share fallow) in comparison with the previous year, while growing farms are those that increased available land or farmed land. Instead, selling and buying farms are evaluated based on owned land. Constant farms are those for which no variation across years is observed. Farmers tend to adjust land to their family needs; however, adjustment takes place more often by leaving a different surface of land fallow, rather than by changing the amount, which is leased or rented in. Sales and purchases are even less frequent, meaning that there are serious obstacles to farm growth. Since the sample does not include corporate farms, any land sale or lease that involves them reduces the total land basket available to family farms; hence, equality between total purchased land and total sold land is not granted. In most years, the share of farms that reduce their farmland, or the land they use, overcomes that of farms that increase them. On the other hand, starting from 2010, the number of farms purchasing land overcomes that of farms selling it. Out of 1,465 property transactions, 848 take place in 2008-2009. The average land area involved is 0.83 ha, but the median is 0.30 ha, due to a strong positive skewness (e.g., two transactions involve 41.8 and 44.1 ha respectively). From 2007 to 2013, the total area of sold land overcomes that of bought land by 121.73 ha, which corresponds to 22,100 ha in the population. Overall, only 80 farm exits (farms that stopped using land) and 68 farm entries (farms that started using land) are observed. The number of farms that sell all their land, or buy some without owning any one year before is nine and five respectively, all concentrated in 2008-2009. These figures prove that the land market is becoming less dynamic, especially if considering property transactions. In 2008, almost 25% of farm are involved in land sales or purchases, while this figure is 7.2% in 2013. Similarly, the share of farms changing

their farmland surface decreases from 25% to around 10%, and the share of those varying the amount of used land decreases from one third to less than 20%. Probably, most families adjusted their land to the desired amount during the first years, and then assumed a more risk-adverse attitude: another proof of the abovementioned poverty trap.

**Table 23. Synthetic indicators of land variations by year (2007-2013).**

| Year | | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|------|---|------|------|------|------|------|------|
| Sample units | | 2,882 | 2,598 | 2,535 | 2,744 | 2,596 | 2,437 |
| Active farms | | 2,223 | 2,012 | 1,990 | 2,149 | 2,053 | 1,987 |
| Total | Shrinking (%) | 12.74 | 16.25 | 8.24 | 6.88 | 5.05 | 6.52 |
| Total | Constant (%) | 75.07 | 71.06 | 81.13 | 85.25 | 90.50 | 89.45 |
| Total | Growing (%) | 12.19 | 12.70 | 10.63 | 7.87 | 4.45 | 4.04 |
| Used | Shrinking (%) | 16.16 | 20.99 | 13.93 | 11.56 | 9.34 | 10.63 |
| Used | Constant (%) | 66.50 | 61.28 | 73.18 | 79.69 | 81.22 | 80.75 |
| Used | Growing (%) | 17.35 | 17.72 | 12.89 | 8.74 | 9.44 | 8.61 |
| Owned | Selling (%) | 11.79 | 10.83 | 7.13 | 4.90 | 4.44 | 3.40 |
| Owned | Constant (%) | 76.44 | 79.67 | 83.63 | 88.20 | 90.99 | 92.77 |
| Owned | Buying (%) | 11.77 | 9.50 | 9.24 | 6.89 | 4.57 | 3.83 |
| Farms exits (%) | | 1.82 | 0.69 | 0.83 | 0.40 | 0.70 | 0.80 |
| Farm entries (%) | | 0.87 | 1.55 | 0.67 | 0.37 | 0.53 | 0.64 |

Source: Moldova Household Budget Survey.

Several drivers influence the decision of farmers to change their size (or the surface of farmed land), or to engage in land property transactions. These are detected by means of multinomial logistic regressions, where the dependent variable can assume three values: -1 if the farm shrinks (or land is sold) in comparison with the previous year; zero if there is no variation; 1 if the farm grows (or land is purchased). A more farm-centred livelihood (i.e. farm income accounting for more than 50% of family income, ownership of a tractor) is associated with a lower probability of either growing or shrinking. If the household owns a tractor, the odd ratios for the probability of varying the amount of farmed land increase by 31%, those for changing the amount of available land by around 50%, and those for engaging in property transactions by over 66%. This happens because of the abovementioned poverty trap, as most tractors are leftovers of the Soviet period rather than the product of investments. Probably, these families can earn much more by providing mechanization services to fellow farmers rather than by growing. On the other hand, they can work their land with less labour and are, therefore, less likely to sell, lease, or leave it fallow. Farmers can barely support financial losses: indeed, a negative farm income in the previous year is associated with higher probabilities to decrease farmland and to farm less land, and a lower probability to buy land. Like farm-centred livelihoods, also underemployment is associate with a lower probability of either growing or shrinking. Instead, a larger family size is clearly associated with farm growth: for every additional member, the odd ratio for the probability of increasing farmland is 29% higher, of farming more land 38% higher, and of buying land 50% higher. These figures confirm that family farms rely on their own labour; hence, its availability represents an absolute constraint. A characteristic associated with variation of owned land is the age of the head: old people show a lower probability of selling land, but also of buying it, confirming the conservative attitude highlighted by the survey and the aforementioned poverty trap. As for location variables, urban livelihoods are less farm-centred: indeed, the odd ratio for the probability of selling their land is 75% higher for urban farms. On the other hand, farms located at less than 60 km road distance from Chișinău are much more stable. This happens because land prices are higher here. Therefore, on the one hand, smallholders expect them to grow further and do not sell their land; on the other hand, they cannot afford buying more land. Then, location in the North is associated with a lower probability of either reducing or increasing the area of farmed land. As shown in the maps, in this region, where agriculture is richer and family livelihoods more farm-centred, landowners tend to allocate land rationally, leasing the surface they do not need and farming the rest, rather than abandoning it. Instead, the region that shows the highest dynamism is the Centre, but far from Chișinău: here, farms show higher probabilities of both shrinking and growing. This is coherent with Cimpoieș (2010), according to whom most market transactions in the 2000s took place in the Centre of the country. As

for variables indicating particular land types, the amount of abandoned land is obviously associated with shrinkage of farmed land, but also with growth of available land, meaning that, if corporate farms stop renting-in land that exceeds family needs, smallholders have no choice but to leave it fallow. Instead, a larger amount of leased land is associated with a lower probability of engaging in property transactions. Finally, there are no particular relations between non-farm incomes and land variations; however, families earning more money off-farm seem less eager to buy land, since they probably chose a non-farm-centred livelihood.

In conclusion, Moldovan family farms are mostly caught in a poverty trap: they lack the financial resources for making consistent agricultural investments and, at the same time, they cannot exit farming, as this income is necessary for survival. This situation, together with an aversion for land sales, hinders the opportunities for families that would like to turn their farm into a viable business, to grow. Rather than a clustering into smaller subsistence farms, and large market-oriented ones, a convergence towards no land changes and no commercialization is observed. The situation is particularly problematic in the Centre of the country, where families tend to leave agriculture and keep their land fallow in hopes of restarting farming, or to get higher prices. Although slowly, land property is transferred from families to corporate farms, which are not included in the HBS sample. It would be interesting to observe what happens once the cohorts who worked in collective farms start dying, and their mostly urbanized children inherit the land. As shown by the survey, young people are less interested in agriculture as the main activity for their family.

## 5.3. From Family Resources to Farm Profit: Production Strategies, Costs, and Output composition

This paragraph focuses on the production strategies of Moldovan family farms. After estimating the production function for both vegetal and animal output, the correlation between total factor productivity and location and household characteristics is analysed. Then, the determinants of two important production choices – whether to farm the big share, and whether to hire non-family agricultural labour – are detected. Finally, farm output, sales and expenditures are decomposed along groups of products and groups of farm inputs, in order to draw attention to differences among farms led by various types of families and, hence, to different socio-economic problems and opportunities.

The production function is estimated using 2013 data. The HBS dataset does not include land and labour inputs for different types of cultivations; therefore, vegetal production is aggregated using median prices, as explained in the third chapter. As for capital inputs, since quantities are not available, total expenditures are considered a reliable proxy. A Cobb-Douglas production function is used. Aggregate vegetal production ($Q_v$) depends on farmed land of all types ($G$), family and hired labour ($L$), used fertilizers ($K_f$), used pesticides ($K_p$), seeds and seedling input ($K_s$), mechanization input ($K_m$), and total factor productivity ($A$). The latter is influenced by farm location, which can be urban, rural, in the North (excluded for avoiding multicollinearity), in the Centre, in the South, or within Chișinău city-district, and by household characteristics (age and family size). Statistical units are farmers who declared some vegetal output, either self-consumed or marketed. Estimated coefficients are reported in the equation below.

$$Q_v = A * K_f{}^{0.05} * K_p{}^{0.05} * K_s{}^{0.11} * K_m{}^{0.01} * G^{0.26} * L^{0.03};$$
$$A = 53.98 * 0.70^{D_{urb}} * 0.94^{D_c} * 0.74^{D_s} * 0.73^{D_{ch}} * 1.03^{age} * 0.9998^{age^2} * 1.37^{size} * 0.98^{size^2}$$

First, since the sum of the coefficients is smaller than one (0.502), returns to scale are decreasing, that is coherent with what was observed in the first paragraph of this chapter. For smaller farms, which rely on labour-intensive production strategies, labour productivity is low; for larger farms, land productivity is low. Output elasticity is highest with regard to land (a one-point increase in farmed land generates a 0.259% increase in total production), followed by the input of seeds and seedlings (0.108%), pesticides (0.052%), fertilizers (0.047%), and labour hours (0.029%). The coefficient for mechanization services, although reported, is not significant. It can be interpreted as a sign that mechanization services are a mere substitute of labour for those families who are too old or small, but want to keep farming their land; since agricultural equipment is often old and inefficient, total production is not increasing thanks

to its use, in comparison with labour use. A minority of farmers (9.0% and 30.6% respectively) makes use of fertilizers and pesticides; however, manure is not included due to lack of data, although, based on the author's survey, people owning animals are using it. The positive impact of pesticide input is not surprising, as farmers are usually weeding by hand, and this is the most labour-demanding activity during the agricultural year. Farmers weed large plots once or twice, even if additional rounds are needed; pesticides solve this issue. As expected, output elasticity with regard to labour is very low, as this factor is overabundant; therefore, farming families are using it inefficiently.

Total factor productivity differs based on farm location and family characteristics. The latter may be considered, somehow, a better specification of labour effectiveness, as the labour variable does not take into account the vigour of household members, and underestimates the occasional contribution of members having another job, who did not declare any hour of farm labour. First, total factor productivity is lower in urban areas, probably because urban farms are often a side activity. Then, it is highest in the North (which confirms the agricultural vocation of this area, where people tend to lease surplus land rather than abandoning it), followed by the Centre, and by the South (where the dry climate impedes a more intensive agriculture). Chișinău city-district, coherently with what told as for urban areas, shows a value slightly lower than the South. If considering the age of the family head, total factor productivity shows a parabola trend: it is highest for households headed by 52 years old people, and lowest for heads aged over 89; however, more than 50% of family heads are aged between 50 and 70. As for family size, productivity increases for every additional member up to seven (although only 11 households are larger), but the marginal contribution is decreasing, which proves the presence of widespread unemployment, so that surplus labour is not used efficiently.

The determinants of animal output are also estimated using 2013 data and a Cobb-Douglas-shaped production function. As for vegetal products, also animal ones are aggregated using median prices, and expenditure for variable inputs (feed) is considered a proxy of quantities; as for labour, since it is not possible to obtain the amount of hours dedicated to animal care, the same variable ($L$) is used. Total animal output depends on the number of cows ($N_{cow}$), sheep ($N_{sh}$), goats ($N_g$), pigs ($N_{pig}$), poultry animals ($N_{pou}$), other animals ($N_{oth}$), on the input of feed ($K_{feed}$) and labour ($L$), and on total factor productivity ($B$). The latter is affected by location, household characteristics, and availability of dedicated spaces for keeping the animals. Statistical units are farmers who declared any animal production, either self-consumed or marketed. Estimated coefficients are reported in the equation below.

$$Q_a = B * N_{cow}^{0.77} * N_{sh}^{0.25} * N_g^{0.31} * N_{pig}^{0.35} * N_{pou}^{0.18} * N_{oth}^{0.16} * K_{feed}^{0.003} * L^{0.02};$$
$$B = 223.06 * 0.88^{D_{urb}} * 1.15^{D_s} * 1.02^{age} * 0.9998^{age^2} * 1.49^{size} * 0.97^{size^2} * 1.14^{D_{vet}} * 1.11^{G_s} * 0.79^{D_{st}}$$

First, since the sum of the coefficients is higher than the unit (2.042), returns to scale are increasing. This happens because the sample does not include large animal farms. Differently from farms specialized in vegetal production, for whom fixed costs at zero output are limited to the land tax, and variable costs are a continuous function of land input, the cost of growing additional animals, especially investment ones, are elevated and discrete. Hence, farmers increase the number of animals over family consumption needs only as long as marginal returns are also increasing. Output elasticities with regard to different animal types show the nature of them. Increasing the number of cows by one point causes a 0.768% increase in production: since only 704 families own cows (of whom 523 one and 154 two), in most cases, this means buying an additional cow. A one-point increase in the number of sheep or goats causes a raise in animal output by 0.251% and 0.306%, respectively; 247 families grow sheep, the average number being 8.2, while 321 families grow an average of 2.1 goats. The output elasticity for pigs is slightly higher (0.346%); 607 families grow an average of 1.4 pigs. As for poultry, almost all households (3,232) have some, the average being 22.9; therefore, even if the elasticity is low, in order to increase the overall animal output, due to the low value of poultry products, families need to buy a large number of these animals. The residual category includes very different animal types (rabbits, nutrias, bee families, horses, etc.); output elasticity is low (0.159%) but, e.g., horses are grown for power rather than for nutrition. Output elasticity with regard to labour is, once again, very low

(0.016%), as animal care is a labour-demanding activity. Finally, the coefficient for animal feed, although reported, is not significant.

Total factor productivity is four times higher than for vegetal production (223.06), is less influenced by location, and more influenced by family features. Understandably, urban farms are less productive, since they have a smaller space available and rely almost exclusively on poultry. Farms located in the South are significantly more productive than the average, probably because of large sheep herds. In addition, families who spent for veterinary controls are significantly more productive. As for family characteristics, the relation between total factor productivity and head age is parabola-shaped: productivity is highest for heads aged 48 and lowest for those over 81. Compared to vegetal production, productivity is similar for young ages and lower among the elderly. Focusing on family size, marginal increases of productivity are larger than for vegetable production, but the peak is reached for six members. These figures prove that animal care is a very labour demanding activity and elderly people can barely grow large animals.

**Table 24. Results of logistic regression for farming the "big share" (2013).**

| Number of strata: 1 | | | | | Number of observations: 5,082 | | |
|---|---|---|---|---|---|---|---|
| Subpopulation number of observations: 2,373 | | | | | Subpopulation size: 528,186.35 | | |
| Design degrees of freedom: 5,081 | | F(9, 5073) = 41.56 | | | Prob. > F = 0.0000 | | |
| **Use of the big share** | **Coeff.** | **St. err.** | **t** | **P>\|t\|** | **95% conf. int.** | | **Δ odd r.** |
| **No use of the big share** (base outcome) | | | | | | | |
| Northern region (dummy) | **-1.333** | 0.120 | -11.07 | 0.000 | -1.569 | -1.097 | **-73.63%** |
| Southern region (dummy) | **-0.886** | 0.136 | -6.50 | 0.000 | -1.153 | -0.618 | **-58.76%** |
| Chișinău region (dummy) | -0.070 | 0.589 | -0.12 | 0.905 | -1.224 | 1.084 | |
| Share of ethnic minorities (%) | **-1.544** | 0.252 | -6.12 | 0.000 | -2.038 | -1.049 | **-78.64%** |
| Age of the household head | **0.126** | 0.028 | 4.42 | 0.000 | 0.070 | 0.181 | **13.38%** |
| Age of the household head (squared) | **-0.001** | 0.000 | -4.99 | 0.000 | -0.002 | -0.001 | **-0.13%** |
| Sex of the household head (dummy) | **0.477** | 0.116 | 4.10 | 0.000 | 0.249 | 0.705 | **61.13%** |
| Total family free time (days) | **0.000** | 0.000 | 4.30 | 0.000 | 0.000 | 0.001 | **0.04%** |
| Tractor ownership (dummy) | **1.546** | 0.295 | 5.24 | 0.000 | 0.967 | 2.125 | **369.25%** |
| Constant term | **-3.367** | 0.784 | -4.29 | 0.000 | -4.905 | -1.830 | |

Source: Author's elaboration on Moldova Household Budget Survey data.

The decision of farming their own big share is an important one, at least from the psychological point of view. The author's survey showed that families who are not using these plots tend not to see themselves as proper farmers. However, when grouping farms based on the use of big shares rather than on the size of farmed land, most variables are not significantly different in mean (also because sizes of small and big shares vary much depending on location, and tend to overlap). Hence, this grouping is not used; however, it is interesting to analyse which factors affect the decision of families to farm at least a part of their big shares. Statistical units are families owning such type of land, which account for over 500,000 citizens. First, location and, consequently, territorial vocation, is a key factor: compared to the Centre, which is omitted for avoiding multicollinearity, farms located in the North have a much lower probability of using their big shares; the same happens in the South. It is consistent with previous findings, according to which Northern farms tend to lease the land they do not need, while in the South a big amount of land is either leased or left fallow. The share of ethnic minorities detects villages located in marginal districts, like Taraclia and Găgăuzia, and other settlements, where a lack of control by central authorities allowed land grabbing by local leaders (Dudwick *et al.* 2007, p. 23); indeed, the highest the share of minority population, the lowest the probability of farming the big share. As for family characteristics, the probability increases with the head age and decreases with its squared value, so that it is highest for families led by heads aged 52; moreover, it is higher for families led by a man. In this model, family size is replaced by free time (total available time, less non-farm working time of family members), which can be used for agricultural activities. The probability of farming the big share increases for additional free days (8 hours). Finally, the ownership of a tractor increases the odd ratio by 3.7 times, proving that the low level of mechanization is an important constraint for the growth of Moldovan family farms.

Reliance on family labour is a key principle for defining peasant farms. Out of 4,059 family farms in the 2013 sample (covering 2,348,224 people), only 766 declared some expenditure for agricultural salaries (corresponding to 361,968 people). After dividing this exit by the mean daily wage detected through the author's survey (150 MDL), the resulting average number of paid working days is 5.1, and the median 3.3. The use of hired agricultural labour is strongly correlated with commercialization of farm production and with a larger area of farmed land (the odd ratio increases by 65% for every additional hectare). On the other hand, a lower probability of hiring labour is observed for households who own a tractor, and for large ones (the odd ratio increases by 31% for every additional working age member). Finally, farms located near the capital tend to hire more often external workers. Overall, farmers rely on hired labour only as long as they cannot fulfil their needs with family labour, but the number of paid working days is very limited.

**Table 25. Results of logistic regression for hiring agricultural labour (2013).**

| Number of strata: 1 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Number of observations: 3,951 | | | | Population size: 916,680.9 | | | |
| Design degrees of freedom: 3,950 | | F(5, 3946) = 45.54 | | | Prob. > F = 0.0000 | | |
| **Hiring of external labour** | **Coeff.** | **St. err.** | **z** | **P>\|t\|** | **95% conf. int.** | | **Δ odd r.** |
| **Only family labour** (base outcome) | | | | | | | |
| Share of marketed production (%) | **1.563** | 0.194 | 8.07 | 0.000 | 1.183 | 1.943 | **3.78%** |
| Tractor ownership (dummy) | **-0.492** | 0.259 | -1.90 | 0.057 | -1.000 | 0.015 | **-38.87%** |
| Distance from Chișinău | **-0.003** | 0.001 | -4.35 | 0.000 | -0.004 | -0.002 | **-0.28%** |
| Farmed land (ha) | **0.498** | 0.000 | 6.62 | 0.000 | 0.000 | 0.000 | **64.54%** |
| No. of working age members | **-0.376** | 0.047 | -8.08 | 0.000 | -0.467 | -0.285 | **-31.35%** |
| Constant term | -0.315 | 0.535 | -0.59 | 0.555 | -1.364 | 0.733 | |

Source: Author's elaboration on Moldova Household Budget Survey data.

The previous analysis focused on aggregate farm production and necessary inputs, without decomposing them. However, Moldovan family farms exhibit a very diverse production basket. In 2013, a single product represented over 50% of farm output for only 1,349 farms, covering a population of 320,022 people, and in almost 1,000 cases, it was a very broad category, like meat, vegetables or fruits, followed by wine and grapes (150 farms). The situation was slightly different for farm sales: out of 1,471 farms engaged in market activity, 1,386 obtained more than 50% of their money income from a single product (in the order: wine and grapes, live animals, walnuts, milk and dairy). However, the average share of production sold is just 12.9%; therefore, specialization may play an important role for a small number of market-oriented family farms, but is not significant for the large majority of them. Farm profit (including farm income in kind) is a much more relevant variable, and the next paragraph focuses on its impact on poverty. As specified in the first paragraph, it accounts for around one fifth of the income of households who farm some land. At constant 2010 prices, it varies between 8,704 MDL in 2007 (the first year when the NBS calculated it, probably with a different methodology) and 5,102 MDL in 2009 (the year of the crisis). Since 2008, it has been varying between five and six thousand, reaching 5,441 MDL in 2013. In order to overcome the bias introduced by the NBS's practice of deducting farm exits monetary income, here the focus is on farm income proper, excluding land rent and earnings from suppling mechanization services. In 2013, the average monetary value (current prices) of agricultural output was 8,078 MDL, of which 2,056 MDL from commercialization, while total farm expenditures accounted for 3,018 MDL. Tables 11, 12, and 13 of the Appendix report all figures described below. It is important to specify that only final products (either self- consumed, or sold) are included, while products used as intermediate inputs can be barely quantified. However, farms spend on average 234 MDL for self-produced feed and 151 MDL for homemade seeds; if included in farm output, these would account for 2.8% and 2.6% respectively, on average. Hence, corn production from house gardens and small shares is underestimated, since it is used for feeding animals.

The value of processed products is included in the category of the corresponding unprocessed product: *kompot*, fruit juice and fruit wine in the "fruit" category; all cheeses, sour cream and butter in the "milk and dairy" one; etc.

Overall, meat and vegetables account each for a fifth of the value of farm production, followed by fruit (almost 15.0%), wine and grapes (8.6%), milk and dairy (6.6%), and eggs (6.3%). As expected, due to small land area and low yields, cereals and industrial plants (mostly sunflower) make up only 4.8% and 3.1% respectively, around the same value of potatoes (3.8%) and walnuts (3.5%). In the region around Chișinău, farmers produce comparatively more fruits (19.9%), wine and grapes (14.1%), and walnuts (5.7%), while peripheral areas show a more diversified basket, with meat and meat preparations at the top (23.0%), and a comparatively larger share of cereals (5.8%) and industrial plants (3.7%). As for urban farms, vegetables make up a very large share of their output (27.7%), together with fruits (23.0%); meat and milk are relatively less important, differently from eggs (9.0%). These figures prove the role of urban "farms" as gardens for supplementing family incomes, eventually growing poultry; indeed, their average output (3,262 MDL) is less than half the general one. Focusing on commercialization, the production basket is significantly different between subsistence and semi-commercial farms. The former produce an average value of 5,687 MDL, made of comparatively more meat (24.0%), vegetables (22.2%) and fruits (17.6%). The latter produce three times more (16,284 MDL), but the top outputs are milk and dairy (15.6%), followed by a comparatively small share of meat, a large amount of grapes and wine (13.3%), less vegetables and fruits, and an important share of live animals (8.8%). A similar pattern is observed when considering farms grouped according to their size. Small ones produce an average of 4,764 MDL, which includes a comparatively larger share of vegetables and fruits, followed by meat and by an important share of eggs. Middle-sized ones present an output more than double (10,591 MDL), with comparatively more meat, milk and dairy, and wine, and important but comparatively smaller shares of vegetables and fruits. Finally, big farms have an average output of 22,048 MDL, that is very diverse: meat, grapes and wine, fruits, vegetables, and milk and dairy account for more than 10.0%, but grape and wine (13.6%), milk and dairy (10.9%), cereals (8.2%), live animals (6.5%) and industrial plants (5.9%) are comparatively much more important. If considering jointly farm size and the level of commercialization, the subsistence role of vegetables, fruits and eggs (together with meat) emerges even more clearly. Wine is the most important output for large semi-commercial farms, together with milk and dairy, and live animals; cereals and industrial crops are comparatively more relevant but, on average, they account for only 13.8% of farm output, due to low prices and low yields.

When grouping farms based on the characteristics of the family, female-headed ones show the lowest average output (5,373 MDL), followed by the elderly (5,616 MDL); large households produce the most (12,975 MDL), followed by those with children (10,852 MDL). Young ones are below the average (6,539 MDL). As for composition of the output, meat and meat products account for more than one fifth among all groups, but they are relatively more important for large families and families with children, proving that rearing is a very labour-intensive activity. Indeed, these groups are also producing comparatively more milk and dairy products; on the other side, the elderly produce an important value of eggs, since growing poultry requires less effort. Fruit trees are abundant and do not need much care; therefore, fruits account for more than 15.0% among all families. Interestingly, families with low educated heads produce the smallest share of fruits (13.8%), young ones the largest (22.1%): this could be a proof that the youth cares more about having a healthy and equilibrated diet. The third product category that accounts for a relevant share of farm output are vegetables: these make up between 17.5% for families with migrants, and 24.9% for young ones, and are the most important category for the latter, the elderly and female-headed families. Finally, grapes and wine account for 10.2% for family with migrants, and are an important product for the elderly and less educated families, while the youth – confirming their more equilibrated diet – produce significantly less of it (5.4%).

Only 35.2% of farms sell some products; considering all farms, sales account for 2,056 MDL (12.9% of output) on average. The composition of sales differs from overall output: wine and grapes make up 20.0% of it on average, followed by walnuts (18.0%), live animals (17.5%), milk and dairy (16.5%). Vegetables and fruits are mostly self-consumed, like meat and eggs, while cereals and industrial crops make up almost the same percentage of overall production and sales. The share of farms engaged in market activities is not significantly different depending on the distance from Chișinău, but is much lower among urban farms (8.5%). Not all farms classified as semi-commercial

sell farm output: 16.7% of them are probably obtaining monetary income only from land rent and from provision of mechanization services. Wine is the most important source of monetary income for farms based next to the capital (35.1%), for medium-sized ones (24.9%), and for large, semi-commercial ones (22.9%), which earn 18,386 MDL on average from sales. Instead, milk and dairy products are the first source of currency for farms based in peripheral areas (18.5%) and for semi-commercial ones (23.5%). Large farms get the largest share of money income (20.5%) from selling living animals. Interestingly, subsistence farms and small ones earn the largest shares (27.3 and 26.3% respectively) from selling walnuts. This figure reaches 38.2% if subsistence and small size are considered jointly; however, total monetary income is just 100 MDL. The role of walnuts as a source of currency for the poorest is due to a favourable contingency, where walnut kernel is one of the few products that can freely access the EU market and Moldova has relative abundance of trees, used for delimiting plots, or as windbreaks along the streets. The survey confirmed this circumstance, which pushed several Moldova citizens to invest in walnut orchards.

Focusing on family characteristics, the youth are earning the smallest amount of money from sales (1,023 MDL), followed by the elderly (1,048 MDL) and by female-headed households (1,059 MDL), whereas those with children (2,492 MDL) and large ones (3,166 MDL) earn the most. Young families are also selling the smallest share of their output (8.8%), families with migrants the largest (13.3%). Moreover, young families present the most diversified basket, with by far the highest share of fruits (12.1%) and vegetables (13.9%) among all groups: it seems that they are not following a specific production pattern, but rather using agriculture as a side-activity and selling surplus products. However, the shares of potatoes and industrial crops are much larger than for other groups, due to a small number of young families that specialized exactly in these products. Overall, wine is the most important sold product among young households and households with migrants; walnuts are prevailing among those with old, female, and poorly educated heads; live animals represent the main source of money for those with children, and especially large ones. Finally, it is worth pointing out that milk and dairy grant around one fifth of earnings to the latter group, while eggs, although secondary, are more important for the same farms that rely on walnuts. Therefore, Moldovan families are not following a precise marketing strategy: since some products (fruits, grapes, and walnuts) are overabundant, they use to sell them if there is an opportunity. Apart from a few farms, which decided to concentrate on winemaking – a traditional sector –, the only viable investment is represented by milking cows. A few farms specialized in growing vegetables, potatoes, or in beekeeping are probably emerging, but it is difficult to clearly detect them.

Farm expenditures account for 56.0% of farm output on average. Since most farmers rely exclusively on family labour, expenditures for salaries account for just 3.6% of the total, and even among families hiring external workers, these represent just 19.6%. Taxation is not an issue, as land tax and pension contributions together account for only 4.2% of total farm exits, reaching 9.4% in urban areas and 6.6% next to Chișinău, probably due to stricter controls by State institutions. Given the small area of rented-in land, the corresponding costs amount to 0.1% of total exits. The most consistent expenditure categories are, thus, mechanization services (21.1%), seeds and seedlings (20.1%; 29.0% if considering self-produced ones), feed (13.7%; 22.6% with self-produced one), and live animals (11.0%). Farmers spend less in pesticides (1.8%) and fertilizers (0.8%) than for transportation (3.6%). By observing the share of expenditures on farm outputs, it seems to emerge that households minimize this variable by using family labour, when available; however, they are not following this strategy when, thanks to additional incomes, the expenditure is not constrained. Farm expenditures make up a large share of output in urban areas (70.7%) and next to the capital (64.3%), where family members can get additional money working in the non-farm sector; families with migrants are also spending more (62.4%), since they can rely on remittances. Focusing on household characteristics, young families, large ones, and families with children have the necessary vigour for implementing heavy agricultural tasks (hoeing, seeding, weeding, harvesting) by hand; indeed, they spend a smaller share than average. On the other hand, the elderly and female-headed families have to rely on mechanization services. In general, farm expenditures grow faster than output with an increasing farm area; hence, marginal returns are decreasing. This happens exactly due to

the low level of mechanization, as mechanization services account for 31.3% of costs for middle-sized farmers and 38.1% for large ones. Fertilizer and pesticide expenditures are higher than the average for the latter, but still less than 10% of their total costs. Market integration seems to increase returns, as semi-commercial farms spend only 29.8% of the value of their output. Small, subsistence and urban farms, and farms led by vulnerable categories or by young families, spend more than average for seeds and seedlings, and slightly more than average for animal feed. Hence, farms that plan to grow economically and to integrate in the market have different financial needs from them.

This paragraph demonstrated that production strategies of Moldovan family farms are related to household characteristics rather than market opportunities. Due to severe constraints (low mechanization, poor financial resources, and tiny output markets) and to decreasing returns to scale, farmers tend to rely on existing overabundant resources (vineyards, fruit orchards, walnut trees) or to do traditional less risky investments (milking cows), rather than innovating or growing. Moreover, they tend to produce a diversified output, fulfilling family needs first, and eventually selling the surplus. However, the case of walnuts shows the potential benefits of accessible external markets. High value added products, as vegetables, beans, potatoes and honey, represent interesting investment opportunities, and probably a few farmers are focusing on them, but at the moment, apart from honey, they have mostly a subsistence function. Finally, extensive crops, like cereals and industrial plants, are not a viable option for most smallholders.

## 5.4.    Agriculture and Subjective Wellbeing: Implication of Alternative Livelihoods

The previous paragraphs drew attention to the prevalent subsistence function played by Moldovan family farms. Thus, this paragraph focuses on the effects of farming on the general wellbeing of the Moldovan population, taking into account not only family income, but also self-assessed life conditions, and food security. Indeed, the author's survey showed that farmers express a clear preference for homemade food, consider rural life as healthier and safer, and attribute a great importance to land ownership, and to the resulting independence. However, from the previous analysis also emerged that only a limited number of households pursue a clearly farm-centred livelihood: the share of families earning more than 50% of their income from farming varies between 12.8% in 2007 and 6.0% in 2012, reaching 6.3% in 2013. The share of families for which farm income constitutes a relative majority of their earnings is only slightly higher: from 16.3% in 2007, to 7.6% in 2013. E.g., the share of families that get more than 50% of their income from abroad has been higher in each year apart from 2007, varying from 14.0% in 2008, to 11.3% in 2011 and reaching 12.6% (exactly twice that of farm-centred households) in 2013. Self-employment seems not to be a viable alternative: 5.2% of families earn more than half of their income from a non-farm business, a percentage that has not changed since 2008, apart from a slight decrease in 2009-2010. Finally, due to ageing of the population, the share of households relying mostly on pensions grew from 20.1% in 2007 to 29.0% in 2013, while those relying mostly on waged income was smallest in 2013 (33.9%), after peaking in 2009 (37.7%). Farm income distinguishes from other incomes because of its diffusion. In all available years apart from 2012, more than 70.0% of Moldovan families declared some farm income, followed at large distance by waged income (from 51.9% in 2008, to 49.1% in 2013), pensions (from 45.8% in 2007, to 51.3% in 2013), remittances (22.7% in 2013), and income from self-employment (8.6% in 2013). Less than one percent of families relies on property income, while recipients of welfare decreased sharply, from 39.3% in 2007, to 20.7% in 2013. Hence, due to the lack of employment opportunities in the non-farm sector, remittances seems the only actual competitor of farming for families that want to earn a living.

Table 26 contains poverty and inequality indicators for years from 2006 to 2013. The poverty headcount index reports the share of population living in families whose income per equivalent member is below the poverty thresholds reported in the first row, provided by the WB Poverty Reduction Economic Management unit for Europe and Central Asia. Official poverty headcounts are calculated with regard to household expenditures rather than incomes, since HBS respondents tend to underreport the latter. However, if the official inflation rate is underestimated, expenditures tend to grow faster than poverty thresholds, and the index decreases although no actual improvement is taking place. Moreover, if remittances boost family expenditures, technically poverty may decrease even while the

internal situation is deteriorating. For this reason, alongside official WB headcount indexes, the Table includes those calculated on incomes, using both the same poverty thresholds and the living minimums. Yearly living minimums are calculated by the NBS; they assume different values for rural and urban areas and, in 2013, for villages, towns and big cities. The Gini indexes for land variables are calculated among sample households, i.e. excluding farmland owned or rented-in by corporate farms. Instead, the shares of land owned by and available to families (in opposition to corporate farms) are evaluated with regard to total agricultural land of the country (regardless of its use) in each year, as reported by the NBS.

Poverty is higher in rural areas and among farmers. Apart from a setback in 2009, due to the European economic crisis, the poverty headcount index decreases over years. If evaluated on expenditures, its value more than halves from 2007 to 2013; if calculated on incomes, it decreases by around one third; based on the NBS living minimum, the improvement is much more limited (around one fifth). In 2006, 40.4% of Moldovan citizens were living in a family whose income per equivalent member was below the poverty threshold; this share was 6.8% higher in rural areas. Overall, the share of poor was higher by 4.7% among farmers, but in rural areas, this category was not worse off than the average. When considering the NBS living minimum, the differences in living costs reduce the urban-rural gap to almost nil; however, in 2006, 54.4% of Moldovan citizens were living in a family whose income was below this threshold (it was 57.7% in rural areas). No data on household expenditures are available for 2006; hence, the first such indexes are available for 2007. They amount to 25.8% overall and 31.3% for rural areas, i.e. 10.7 and 13.4 points less than the 2007 indexes calculated on incomes. It proves that earnings are underestimated; however, the gap is larger for rural areas, which could be a sign that the bias regards farm income in particular. Since subsistence products are counted twice, the issue regards farm sales: farmers are selling to neighbours or in local open-air markets more than declared. In 2013, based on expenditures, poverty was 12.7% overall and 18.8% in rural areas: after a slight increase in the former and a larger one in the latter until 2009, the index drops rapidly. Based on income, poverty in 2013 was 24.9% overall and 33.3% in the countryside, while using the living minimum, the headcount index increases to 42.6% and 53.0% respectively, suggesting that no relevant improvement took place in the period under study. Regardless of the index considered, rural areas saw a smaller decline in poverty and the gap with urban areas increased even in absolute terms, meaning that the relative increase was much larger. If considering the living minimum, the decline was less than half and the gap more than tripled. Therefore, the development strategy followed in these years was more successful in improving the condition of urban dwellers, leaving behind the countryside.

Inequality did not change significantly from 2006 to 2013. The Gini index increased slightly until 2009 and then declined until 2012, reaching the value of 0.334 in the last available year, which is lower than in Italy, but higher than in the low-inequality countries of Northern Europe. Inequality among farmers is lower over the whole period.

Since Moldova lacks industries and mineral resources, focusing on the distribution of farming land among households gives an idea of whether the population has access to a basic national asset that may play a fundamental role in a worst-case scenario. Inequality of land property is higher than income inequality, and it increased slightly after 2011: the values of the Gini indexes reported in the Table are similar, e.g., to those referring to income inequality in Latin America and Sub-Saharan Africa. However, if considering total farmland, the distribution is more unequal, even if the gap decreased over years. As specified above, these values do not take into account public land and land owned by juridical persons (i.e. corporate farms). Overall, in 2013, families owned 65.3% of total agricultural land of the country, which is less than the share of land in private hands in 2015 (74.0%); this figure declined over years, after reaching a maximum of 70.0% in 2007. Due to the diffusion of leasing agreements, the share of land actually available to families is amounts to less than half (31.3%); this figure declined slightly after reaching 34.7% in 2008.

Poverty and inequality figures show that, in the period under study, rural areas benefited less from poverty reduction in comparison with urban areas. Indeed, the countryside lacks labour opportunities: the share of households

earning waged income there is slightly over 40.0%, and declined over years. However, thanks to an equitable distribution of land ownership, over 99% of rural dwellers, and between 36% and 39% of urban ones (depending on the year), have access to land and, in most cases, farm it. As mentioned above, the share of families who choose a pure farm-centred livelihood is limited, but for much more of them, farming represents an important side activity. Hence, Moldovan citizens face a dilemma: either earning their living through farming their land, or looking for better job opportunities in towns or abroad. The following paragraphs focus on the implication of different livelihood choices.

**Table 26. Poverty and inequality indicators for farmers and all households in urban and rural areas (2006-2013).**

| Index | | | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|---|---|
| Monthly poverty threshold (current MDL) | | | 747.40 | 839.30 | 945.90 | 945.90 | 1,015.90 | 1,093.10 | 1,143.40 | 1,196.00 |
| Poverty headcount (expenditures) | All country | | - | 25.83 | 26.35 | 26.29 | 21.94 | 17.50 | 16.59 | 12.70 |
| | Rural areas | | - | 31.29 | 34.63 | 36.27 | 30.38 | 25.02 | 22.81 | 18.83 |
| Poverty headcount (incomes) | All country | All | 40.35 | 36.48 | 34.62 | 35.48 | 32.00 | 27.67 | 26.79 | 24.90 |
| | | Farmers | 45.00 | 42.63 | 41.44 | 43.98 | 39.51 | 34.33 | 33.48 | 31.34 |
| | Rural areas | All | 47.19 | 44.65 | 44.41 | 46.92 | 42.89 | 37.73 | 36.22 | 33.34 |
| | | Farmers | 47.31 | 44.60 | 44.82 | 47.26 | 43.05 | 37.57 | 36.45 | 33.46 |
| Population under living minimum | All country | All | 54.44 | 52.95 | 57.99 | 49.09 | 51.39 | 48.27 | 45.43 | 42.61 |
| | | Farmers | 58.16 | 58.19 | 63.84 | 57.43 | 58.50 | 55.29 | 52.97 | 51.25 |
| | Rural areas | All | 57.68 | 57.75 | 65.46 | 58.70 | 60.13 | 57.11 | 54.58 | 52.98 |
| | | Farmers | 57.87 | 57.75 | 66.01 | 59.01 | 60.28 | 57.07 | 54.76 | 53.04 |
| Gini index (income per equivalent family member) | | All | 0.363 | 0.369 | 0.370 | 0.360 | 0.342 | 0.338 | 0.329 | 0.334 |
| | | Farmers | 0.338 | 0.347 | 0.363 | 0.350 | 0.331 | 0.320 | 0.314 | 0.320 |
| Gini index (owned land) | | All | 0.531 | 0.524 | 0.542 | 0.546 | 0.543 | 0.562 | 0.555 | 0.565 |
| | | Farmers | 0.523 | 0.511 | 0.528 | 0.535 | 0.531 | 0.550 | 0.542 | 0.552 |
| Gini index (total farmland) | | All | 0.612 | 0.591 | 0.605 | 0.614 | 0.598 | 0.608 | 0.595 | 0.598 |
| | | Farmers | 0.606 | 0.581 | 0.594 | 0.605 | 0.589 | 0.598 | 0.585 | 0.587 |
| Land owned by families (%) | | | 68.30 | 69.96 | 69.56 | 66.76 | 66.24 | 65.20 | 64.49 | 65.31 |
| Land available to families (%) | | | 33.77 | 33.84 | 34.73 | 32.33 | 32.14 | 31.37 | 31.10 | 31.34 |

Source: Author's elaboration on Moldova Household Budget Survey data.

Due to poor public transports and lack of private means of transports (in 2013, only 19.3% of rural households owned a car), looking for a job in urban areas often means moving there. This is even truer if considering that local towns are similar to villages as for labour market conditions, so that city is often equivalent to Chişinău. Therefore, waged income, as remittances, is alternative to farm earnings, at least for small families. In 2013, the average income per equivalent family member was 25,766 MDL, the median 20,860 MDL. The average share of farm income was 12.7%, of waged income 32.1%, pensions 28.7%, remittances 12.3%, self-employment 4.7%, and welfare 3.2%.

Through propensity score matching, it is possible to obtain the mean impact of each type of earning on incomes per equivalent family member. Remittances are without doubt the most impacting income. Recipient families earn 12,546 MDL more than the control group; without them, families belonging to all income quartiles would experience a reduction of their incomes. As a result, poverty would raise from 24.9% to 29.9% overall, and even more in rural areas, where it would reach 39.3%. However, inequality would also decrease, meaning that, currently, remittances are flowing to relatively richer families. Then, the second most impacting earning is self-employment income: 3,611 MDL on average. Its overall effect on poverty and inequality is limited, since only a small share of families benefits from such income. Waged income has a similar average impact (2,689 MDL), which results higher (3,395 MDL) if families belonging to the control group are matched considering the villages, i.e. hypnotizing limited possibility of movement, so that household members are constrained to search for alternatives locally. Also in this case, incomes would drop for households belonging to all income quartiles; poverty would increase by 12 points, reaching a maximum of 36.9%, as would inequality, topping 0.390. Urban areas would be affected most, with poverty more than double (29.3%). Unexpectedly, if the control group is matched by including villages as a variable, the mean post-treatment effect is bigger but poverty grows less. This is due to a large number of unmatched units and to the inclu-

sion in the control group of families who stayed in the village because they, e.g., started a successful business; however, the number of such opportunities is limited and, obviously, not all wage earners can replace their jobs with self-employment.

The mean post-treatment effect of State transfers is negative: pensions cause a drop of 7,068 MDL (however, when calculated on 50 bootstrap-replicated samples, this value is positive: 246 MDL), welfare – a reduction of 3,754 MDL. The impact of pensions on poverty is positive: since most of the elderly belong to the first income quartile, without such income, the headcount would reach 26.7%, and inequality would raise. Instead, the impact of welfare is almost nil: on average, counterfactual income is higher, but poverty would raise by one point only in urban areas. This could be due to several reasons. Probably, key explanatory variables are omitted when performing propensity score matching. Moreover, the average welfare income (600 MDL) is half the monthly poverty threshold, so that it barely helps recipient families to overcome poverty. As for pension income, recipient families receive an average of 1,332 MDL (considering all household recipients), which is slightly above the poverty threshold, but being over working age, they cannot obtain additional incomes apart from farm output.

The average post-treatment effect of farm income is ambiguous: although it has a negative value (-682 MDL), the result of 50 bootstrap-replicated samples is slightly positive (357 MDL). Regardless of it, the mean counterfactual income is lower than the actual one; this is the result of a reduction of the incomes belonging to the first quartile and an increase of the others. Hence, poorest households benefit most from farming: without this earning, poverty would increase to 28.3%. While in rural areas it would peak 42.2% (the highest hypothetical level), in cities this figure would drop by 2.2%. Without farming, inequality would also raise. Like for waged income, the propensity score is also calculated including villages, and the remittance dummy: farming households are thus compared to families belonging to the same village, and to remittance recipients only as long as they also are. The result in terms of average income, poverty level and inequality does not change much.

Until now, the focus was on the impact of alternative livelihood options on income. However, choices such as moving to the city or migrating abroad have an impact on family wellbeing that goes beyond potential additional earnings. The author's survey showed that, due to its strong association with Moldovan lifestyle, agriculture bears a value in itself. This hypothesis is tested by calculating counterfactual life levels of Moldovan households for 2013. Indeed, the HBS database includes a variable for self-assessed life level, whose value goes from very good (5), to very bad (1). The average is 2.90, and it is slightly higher in rural areas (2.95). The variables affecting the propensity score for creating control groups were: income per equivalent family member, land ownership, growing of poultry, car ownership, good health conditions, residence in urban areas, residence in Chișinău, and presence of at least one migrant in the family. The largest post-treatment effect, *ceteris paribus*, is due to land ownership (0.37), followed by good health conditions (0.23), car ownership (0.19), growing of poultry (0.14), and presence of migrants (0.14), while residence in urban areas or Chișinău have a negative effect (-0.14 and -0.11 respectively). Initial hypotheses are satisfied, the only exception being the presence of migrants. Although remittances consistently increase family incomes, the negative impact of splitting the family was expected to be larger. It is not the case; however, the effect on the average life level is limited. In general, rural dwellers are significantly affected by the variables considered, land ownership having the strongest impact: without land, 66.9% of them would assess their life level negatively, compared to an actual share of 16.6%. Instead, only good health conditions and residence in urban areas affect the life perception of urban dwellers significantly: positively the former, negatively the latter. These figures confirm the conclusion drawn after analysing the drivers of farmers' choices, and extends them to the whole population: the autonomy granted by ownership of land and poultry increases the self-perceived wellbeing of Moldovan families, as does residence in rural areas, where interfamilial relations and the environment are considered better. Health status and car ownership are included in order not to miss important explanatory variables, and prove, indeed, important.

Different variables can affect self-perceived life levels in different ways: either preventing it from deteriorating (basic goods) or improving it above the average (luxury goods). In order to asset these dynamics, a multinomial logistic regression was estimated, where the dependent variables may assume three values: -1 if the household gave a negative assessment (1 or 2), zero for an average one (3), 1 for a positive one (4 or 5). The probability of assessing family life level negatively increases consistently if the health status of the household head is bad, and if the family resides in a big city (Chișinău or Bălți). It decreases for every additional 1,000 MDL spent in clothes, if the family owns a car, if the income is higher in comparison with the sum considered "decent", if at least a member migrated abroad, and for every additional hectare of owned land. Instead, the probability of assessing the life level positively increases if the family owns a car, if at least a member migrated abroad, if they spend more for clothes, if family income is higher, and for every additional hectare of owned land. The same probability is negatively affected by bad health status and by the residence in big cities. Thus, the multinomial logistic regression confirms all dynamics already observed when analysing counterfactual life levels; the regression results are reported within Table 17A.

The importance of homemade food emerged overwhelmingly during the author's survey. Indeed, food security is a serious issue in Moldova: apart from 2006 and 2013, when 38.2% and 37.0% of sampled household respectively declared to have difficulties in paying for food, this figure has always been above 40.0%, reaching 47.2% in 2008. Farming is associated with more food security: in all available years, farmers declared significantly less difficulties in paying for food. Focusing on 2013, this is true regardless of location (urban or rural, central or peripheral): the gap is particularly wide in the countryside (11.7 points) and next to Chișinău (10.6 points). Large families have less difficulties in paying for food if they are not engaged in farming (by 1.7 points), like young ones (by 5.8 points) due to the small amount of land they usually own, and especially households with migrants (by 9.8 points). On the other hand, the situation of landless pensioners is tragic: more than half of them (52.3%) have difficulties in paying for food, 17.4% more than their counterpart. Indeed, on average, farmers cover 28.0% of their food and beverage expenditures with farm products, a figure that reaches 32.8% in rural areas and is constant for all groups apart from urban dwellers (11.0%). Still in 2013, an average of 48.8% of household expenditures (51.3% in the countryside) went for buying food and non-alcoholic drinks: a figure that, considered Engel's law, gives a clear idea of the level of development of the country. The share of food expenditures is even higher if calculated on incomes: 56.7% on average (after equating to 100.0% all cases when food expenditures overcome family income); the median share is similar (53.8%). These figures, which include the value of subsistence food, are higher among farmers: 59.5% and 57.2% respectively. Farmers spend more than half of their income on food, regardless of location and family characteristics, the only exception being those classified as non-poor (i.e. households with an income per member above the poverty threshold), that spend 49.5%. The elderly, female-led families, and families with a mid-low level of education spend more than 60.0% on average, while poor households consecrate to food 81.7% of their income. It is worth noting that among the poor, the median share overcomes the average by three points, meaning that poverty is very severe for a consistent group of them. Moving to non-farmers, these spend around 10.0% less of their income on food; the youth are better off (41.7%), while the elderly keep spending more than 60.0%, and the poor more than 80.0%. Moreover, 9.6% of families spend on food more than their total income; this figure is higher for farmers (11.8% against 4.7%). Interestingly, while among farmers the youth are those who experience this situation oftener (14.2%), and the elderly the least (10.2%), among non-farmers the situation is exactly the other way round. It proves that families belonging to different age groups tend to choose diverging strategies for fulfilling their needs.

This paragraph analysed the impact of farming and alternative livelihood paths on family income, self-perceived wellbeing and food security. Migration emerged as the clearest competitor of farming. Remittances have a sizeable positive impact on incomes; however, they flow mostly to better-off families, increasing inequalities and possibly prices. On the other hand, farming has a negligible average effect on family earning, but impacts mostly on the first quartile, decreasing inequalities. State transfers (including pensions) are too limited for addressing the poverty issue effectively. Non-agricultural self-employment seems to be a viable alternative to farming, but due to small internal

markets, the expansion potential of this sector is limited. Waged jobs increase family income consistently, but they are mostly in urban areas; moreover, instead of growing, the share of families earning at least one wage is shrinking. Indeed, although poverty dropped sharply in the period under study, rural areas were left behind. Farming helped people from the countryside, especially the elderly, to confront this situation by increasing food security: vulnerable family categories are better off if they have access to land, while in the capital their conditions deteriorated because of growing prices. Moreover, farming has an impact on self-perceived life level that goes beyond income and food security: *ceteris paribus*, Moldovans assess their live conditions better if they own some land, grow some poultry, and if they reside in rural areas, where 98.4% of households were still farming their land in 2013.

# 6. Discussion of the Results

This chapter discusses the results of the survey and of the quantitative analysis of the HBS database. After presenting an assessment of the situation of Moldovan family farms, including an answer to the research sub-questions, the object of the study is observed by means of a SWOT analysis. This will demonstrate that the points of strength, weakness, opportunities, and threats are different depending on the perspective: either the one endogenously determined through interviewing farming families, or the objectives set by international donors involved in rural development. Finally, policy recommendations are formulated. Proposed actions aim at achieving both increased market integration of farms willing to pursue this path, and long-term resilience of those who are not interested in business.

## 6.1. Assessment of Transition: Does the Final Output Match the Initial Expectation?

The political forces who promoted land privatization in Moldova at the end of the 1980s had an idealized vision of peasant life, strongly linked to local traditions, and believed that each family could earn a better living by working its own land. This process was formally initiated by the Land code, but stagnated after 1994, when the PDAM, dominated by the powerful rural nomenclature, took power. However, due to the collapse of the USSR, the traditional market for Moldovan food and agricultural products had disappeared without any viable alternative in the short-term. Thus, the country found itself with an oversized farm sector, and collective farms started accumulating huge losses. Strengthened by these harsh economic conditions, the advocates of agricultural reforms won the 1998 elections and implemented the National Land Program with the support of international aid agencies.

The process of insider privatization through distribution of shares involved not only the land, but also the fixed capital (i.e. infrastructures and agricultural equipment) of the collective farms. However, agricultural workers were interested almost exclusively in land, since agricultural machines were oversized for their new farms, whose average area accounted for just 1.4 hectares. Therefore, many heads of the collective farms, who led the privatization process together with local authorities, sold farm assets for paying their debts, or for achieving a personal profit. In general, these people took advantage of their position for grabbing as much resources as possible, buying many big shares of recipients who needed fast money during the harsh years of economic downturn, and created large corporate farms for managing this land. The secession of Transnistria with all industry, and the difficulties in exporting caused budget shortages, so that most farm infrastructure (including irrigation facilities) did not undergo any maintenance for many years and fell into disrepair. Shortly, what was conceived as an equity-driven privatization process resulted in a transfer of the collective farms from the public sector to the families of their heads, who became local "leaders". However, peasant farms created by the land reform proved to be resilient. Although they lease their big shares to the "leaders", as they lack financial resources and machinery for working them, most recipients are retaining the property of these plots. From 2006 to 2013, the average size of farmed land declined from 0.62 to 0.52 hectares, while owned land declined proportionally less, from 1.51 to 1.33. The reduction of total land owned by households is probably due to its sale to corporate farms, which are not included in the HBS sample. Although it is difficult to foresee future moves of the first post-Soviet (mostly urbanized) generation after their parents' death, it is likely that, unless political action is taken, they will gradually sell most of their land to large corporate farms and pursue off-farm centred livelihoods.

In one or two decades, the situation will probably be similar to the late USSR, when households held only small plots for fulfilling family needs, with the difference that there will be no collective farms providing jobs and services in rural areas. Large corporate farms hire agricultural workers, but this is mostly seasonal labour, and their growing mechanization is reducing labour demand: the number of employees has been rapidly declining, from 125 per farm in 2004, to just 47 in 2012 (Moroz *et al.* 2015, p. 25). These farms «are specialized in the production of low value-added crops (such as cereals, oilseeds, sugar beet)» because of «relatively low production cost […], availability of agricultural machinery allowing the rapid cultivation on large areas, relatively simple and cheap post-harvest facilities, as well as assured markets for these commodities» (Moroz *et al.* 2015, p. 12). For all these reasons, they do not

represent a viable employment opportunity for rural households, and young members are gradually abandoning the countryside. They often move to Chișinău: at the end of 2014, 48.1% of 723,549 salaried workers were based there, while the relative share of population was just 22.8%. Otherwise, they migrate abroad on a temporary or permanent basis. A smaller number comes back to the village and decides to invest in agriculture. This is possible only if their parents have not sold their big shares in the meanwhile. Usually, these new farms are more innovative and economically efficient than large corporate ones, which rely mostly on their established position.

Observing the current situation of the family farms created by the NLP, is it possible to say that the initial expectations of the recipients were fulfilled? If the land reform is judged simply with regard to the formal assignment of land plots to the wide rural population, the initial objectives of its advocates were fulfilled. In addition, the *autonomy* of rural families grew, as they are currently able to produce their food without relying on waged income: a situation similar to the one described by Chayanov at the beginning of the 20th Century. However, the promises of an overall improvement of life conditions supported by the «neoliberals» (Gorton and White 2003, p. 308) did not materialize. Led by urban intellectuals, the "strange" alliance of peasants and linguists was successful in mobilizing large sectors of the population, but did not have a clear understanding of the dynamics of agricultural markets. In a society where land property is widespread, markets for agricultural products risk remaining underdeveloped, and farmers cannot earn enough money in order to improve their condition above subsistence. Instead, the rural nomenclature perceived clearly the importance of external markets for accumulating resources. For this reason, they primarily stopped the process of land distribution; then, once it became clear that oversized collective farms had no future due to fragmented international markets, they worked for turning the privatization process in their favour. Current corporate farms are carrying out the same function of former collective ones, but with lower labour costs and without redistributing the profits. In the same time, Moldovan families obtained the *autonomy* they had been looking for during the last years of the USSR. Embedded in a favourable sociocultural environment, the new peasant farms dictated the rhythm of the lives of rural dwellers in the following two decades, until today, allowing them to overcome relatively safely the harshest years of transition. Briefly, the target of granting decent life conditions to the population was not achieved, but the instrument through which pursuing life satisfaction was successfully created.

**Table 27. Farm clusters based on HBS data, and key variables by cluster (2013).**

| Family farm clusters | % (a) | Family size (h) | Head age | Male head (%) | Central farm (%) | Urban farm (%) | Farmed land (ha) | Farm income (%) | Marketed share (%) | Cows per family | Wine sales (MDL) | Family income (MDL) | Life level (1-5) | Poor (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pure subsistence | 39.15 | 2.03 | 62.25 | 48.90 | 19.09 | 22.45 | 0.368 | 14.58 | 1.31 | 0.13 | 3 | 31,807 | 2.86 | 41.55 |
| Part-time | 26.69 | 3.02 | 49.96 | 69.28 | 30.39 | 31.22 | 0.356 | 9.23 | 1.18 | 0.14 | 1 | 57,318 | 2.96 | 24.70 |
| Transitional | 28.22 | 2.56 | 55.21 | 67.81 | 29.06 | 15.59 | 0.772 | 27.30 | 36.44 | 0.43 | 352 | 46,631 | 2.96 | 26.14 |
| Farm business | 5.94 | 2.36 | 55.60 | 73.22 | 32.18 | 7.54 | 1.401 | 46.99 | 51.24 | 0.23 | 793 | 39,755 | 3.04 | 38.16 |

Source: Author's elaboration on Moldova Household Budget Survey data. (a) Share on total farms (%); (b) All variables: average value.

Although the expression "family farm" has been used for indicating any farm led by a physical person, this population is extremely diverse. Is it possible, however, to identify clusters? Taking into account family features, farm size, geographical location, and market integration, as described in the first paragraph of the previous chapter, four groups are identified, corresponding roughly to those detected in the EU New Member States of Central and Eastern Europe by Davidova *et al.* (2009), with the remarkable exception of the third, although their relative size is different:

1) *Pure subsistence farms*: led by vulnerable categories, like pensioners, disable people, and widowed women from the countryside and peripheral areas, farm a limited size of land (usually the house plot and the small share), and produce almost exclusively for self-consumption, although in many cases this is not enough to escape poverty.

2) *Part-time farms*: led by younger families, which chose an off-farm centred livelihood, are often located in urban areas or near Chișinău, farm a limited land size (as they did not receive a big share), produce almost exclusively for self-consumption, and are able to escape poverty by earning large incomes in alternative economic sectors.

3) *Transitional farms*: led by rural families in late adulthood, whose children have not decided yet whether pursuing a farm-centred livelihood, farm an average land size (sometimes including the big share) and grow large animals, that allows them to obtain a marketable surplus and to earn a decent income, supplemented through waged jobs.

4) *Commercial farms*: led by rural families in their late adulthood that decided to invest primarily in their land, farm all of it (including the big share), sell more than half of their output, and obtain almost half of their family income from agriculture, although in many cases this does not allow them to escape poverty.

The four clusters were roughly identified in Table 27 by considering jointly two variables: the share of marketed output (excluding expenditures, and farm-related incomes like land rent or mechanization services), and the relation between farm and off-farm working hours of the family during the year. While in the EU New Member States the largest group is represented by transitional farms, called «small commercial» (Davidova *et al.* 2009), in Moldova, pure subsistence farms are dominating (39.2%); these can barely benefit from the only large market of the country, Chișinău, since they are oftener situated in periphery. The third group was defined "transitional", focusing more on the role of agriculture for the future of these families, rather than on the share of marketed production. Indeed, while "part-time" farmers have already chosen an off-farm centred livelihood, and "commercial" farmers turned their land into an agricultural business their children can inherit, farms belonging to this group will probably move toward one of these two scenarios in the next years, when their heads reach the old age and their children face a clear life choice. Finally, the average farm size is much smaller than in the EU, as only commercial ones farm more than one hectare.

The NLP was approved in March 1998, and land shares were distributed in the following years, so that in April 2001, 513 thousand citizens had already received theirs (Gorton and White 2003, p. 223). The advocates of reforms considered that this situation of extreme fragmentation would have disappeared in the following years thanks to the land market, thus generating efficient, middle-sized familial farm businesses. However, based on the HBS dataset, is there any clear emerging pattern as for land ownership and market integration? If the purpose is to achieve a more efficient land distribution, the answer is negative: the land market has been losing dynamism between 2006 and 2013. Smallholders adjusted their land size in the first years after privatization through the rental market, where large corporate farms are the key stakeholder. Land sales and purchases, and especially farm exits and entries, are a marginal phenomenon, so that opportunities of farm growth are hindered. Increases or decreases of farmland seem to be one-term choices rather than enduring strategies, so that in the long term, 84.3% of the farms will keep the same size. As for farm intensification and market integration, the same pattern is observed: unprofitable farms tend to accumulate losses, and only a limited number of farms are able to progressively increase their productivity. Consequently, the relevance of farm earnings on family income is constant or decreasing. In the long-term, a limited share of 11.0% of farms will be able to maintain an important degree of market integration, gaining over 50% of their farm income in money, while 71.0% will be pure subsistence farms. The provision of mechanization services is comparatively much more profitable than farming, so that owners of agricultural equipment focus on this livelihood strategy. Overall, a majority of farmers seem to be caught in a poverty trap, where, on the one hand, they do not hold enough resources for increasing their farm production and, on the other hand, they cannot stop farming as this is needed for ensuring the survival of the family. In this sense, due to the paucity of State transfers, the land plays the role of a social buffer.

This situation is the result of a limited resource endowment, which compels family farmers to achieve resilience through small, low-cost solutions. How are they combining these resources in order to obtain farm income? Due to the lack of a viable labour market in Moldovan villages, and the low level of mechanization, farming families have to rely almost exclusively on their power, eventually resorting to exchange of labour with fellow villagers. Mechanization services are solicited only for heavy tasks that cannot be performed by hand (e.g. ploughing), and represent by far the biggest cost for mid and large size farms, thus impeding their growth. As for owners of agricultural machines, their production strategy is «*labour-saving*», opposed to the «seed-fertilizer-water technology», favoured by smaller farms: «the former saves labour by making it more productive; the latter saves land by making it more productive»

(Ellis 1992, p. 177). Most Moldovan family farms use labour-intensive production strategies, eventually relying on better-performing seeds, manure, and well water. As a result, land productivity is high, labour productivity is low, and returns to scale are decreasing. The situation is different for animal production: since costs are high and discrete, farmers increase their stocks only as long as they can capitalise on them, and returns to scale are increasing. Overall, farmers tend to diversify their output rather than specialize. Instead, as for sales, they tend to focus a single product, which however represents a limited share of the whole farm production. Cereals and industrial crops are often sold, but due to the small land size and low prices, they play a secondary role. Vegetables, beans, potatoes, poultry products (eggs and meat), and partially fruits are the cornerstone of family subsistence. Wine and grapes, milk and dairy products, living animals, walnuts, and partially fruits, are the typical marketed output. However, this specialization relies on circumstances inherited from the USSR (surplus of vineyards and orchards, local renown products, like cherries in Truşeni), or on "traditional" investments (milking cows), rather than on innovative ones based on external funds, since peasants are conservative and risk-adverse. Moreover, in case of availability of additional financial resources, e.g. remittances, or waged incomes near the capital, smallholders use them for covering farm expenditures, limiting the drudgery of labour, even at the cost of reducing farm profits to zero, in order to keep producing homemade food.

Indeed, for Moldovan families, migration and farming are competing strategies for earning a living. The former allows them to obtain a sizeable income at the price of abandoning their homeland and dividing the family; the latter has more complex implications, which were partially detected through the author's survey and were the object of an additional focus. Based on the HBS dataset, which is the impact of land ownership and use on poverty level and on the overall family wellbeing? First, farm income is the most diffused type of income, as 70.0% of Moldovan families earned something from agriculture in 2013; however, its contribution to household income is limited, as it accounted for just 18.6%. While remittances, *ceteris paribus*, increase considerably the income of recipient families, agricultural earnings have a different effect: they impact on the lowest income quartile, reducing poverty especially in rural areas, and the level of inequality in the society overall. A lower percent of farming families has difficulties in buying food compared to landless ones, especially among the elderly. Moreover, Moldovan families tend to assess their life level better if, *ceteris paribus*, they own some land, grow some poultry, and reside in rural areas. Although poverty decreased considerably from 2006 to 2013, the gap between the countryside and cities increased because of the lack of employment opportunities in the former apart from agriculture. Therefore, family farming prevented, at least partially, the depopulation of a core region of Moldova, while providing additional food to urbanized family members.

In conclusion, family farms have definitely played the role of a fundamental social buffer in a situation of harsh economic conditions. Instead, they have not been able to work as the major driver of economic development of the country, since they had to confront tight financial constraints, and to compete with large corporate farms abusing of their dominant market position. The latter are able to satisfy alone the external demand in a situation of underdeveloped internal market. However, only a minority of families are interested in turning their farm into a market-oriented agricultural business. The function of peasant farms goes far beyond their role as economic agents. They allow Moldovan families, especially in rural areas, to achieve a high degree of *autonomy*, which is essential for self-rewarding and for social appraisal of the good "*gospodar*". Homemade food and agricultural labour help preserving family ties, including with members who moved to urban areas, and are at the core of a thick network of interfamilial relations. Hence, peasant farms are part of the immaterial cultural heritage of the country, and only as such can be understood.

## 6.2.    Strengths, Weaknesses, Opportunities and Threats for Moldovan Family Farms

Given the characteristics and socioeconomic perspectives of Moldovan peasant farms discussed in the previous paragraph, a SWOT analysis in implemented in the present one. This is a process of synthesis, which identifies four categories of variables associate to a specific product, location, socioeconomic sector, or person (in this case, Moldovan family farms): points of *Strength* and of *Weakness* are internal; *Opportunities* and *Threats* are external. The resulting matrix is usually filled through an interactive process, e.g. focus groups; in this case, information collected

through the questionnaire, and facts observed thanks to the analysis of the HBS database are considered. Moreover, a preliminary process of problem setting is needed, as the variables are identified with regard to specific objectives (Pasqui 2005, p. 121). For this reason, two separate SWOT matrices are filled. The first one is based on motivations of farmers detected by the 31-item Likert scale inserted in the author's questionnaire, i.e. guaranteeing the survival and the *autonomy* (as defined above) of the family, for the present and future generations, possibly inside its native village. The second one refers to the prevalent objective of development projects financed by international donors, i.e. transforming peasant farms into viable businesses by increasing competitiveness and market integration.

Strengths and weaknesses refer to the resource endowment of family farms. These include human capital, financial resources, organizational advantages or disadvantages, physical capital, access to natural resources, experience, etc. Opportunities and threats refer to the external environment: community, society, geographical features, market characteristics, foreign policy, etc. Some of them are typical of family farms, compared to similar socioeconomic units; some are general features of the Moldovan context, which facilitate the pursuing of the identified objectives. While some characteristics (e.g. diversification of farm output) can represent an advantage with regard to one of the objectives, they are an obstacle with regard to the other.

**Table 28. SWOT analysis with regard to the endogenous objectives of family farmers, as detected by the author's survey.**

| Strengths | Weaknesses |
|---|---|
| • Widespread land ownership and good soil fertility<br>• Inheritance of Soviet vineyards and orchards<br>• Availability of water from the well in almost every house<br>• Availability of large house plots for growing poultry<br>• Capacity of resilience through small, low-cost solutions<br>• Generation-old experience in agriculture<br>• Surplus of family labour to be used in farm production<br>• Intergenerational cohesion of the family<br>• Risk reduction thanks to diversification of farm output<br>• Risk reduction thanks to diversification of family income<br>• Limited monetary needs for current expenditures and goods<br>• Availability of remittances for purchasing variable outputs<br>• Cultural and spiritual ties with agriculture | • Distance of big shares and fragmentation of small share plots<br>• Desertion of many orchards after their privatization<br>• Lack of irrigation facilities in open fields<br>• Low level of mechanization and lack of storage facilities<br>• Lack of private means of transport<br>• Limited permeability to externally-generated innovations and consequent inefficient use of family labour<br>• Limited knowledge of the farm-related legal framework (leasing agreements, food quality standards, etc.)<br>• High average age and shrinking family size<br>• Small internal incomes and limited State transfers<br>• Emigration of the youth from rural areas and loss of interest for agricultural activities |
| **Opportunities** | **Threats** |
| • Low level of taxation of agricultural activities<br>• Improved access to the EU labour market allows earning remittances to be invested in agriculture<br>• Strong interfamilial ties in the villages allows exchange of farm labour and door-to-door sales to neighbours<br>• High popular appreciation for homemade food and mistrusts for food purchased in shops facilitates farm sales<br>• Improvement of transport networks by donors facilitates commuting as alternative to urbanization for employees<br>• Improvement of rule of law thanks to EU support | • No State subsidies for semi-subsistence farmers<br>• Limited availability of credit and high interest rates<br>• Reduced access to the Russian labour market for emigrants<br>• High costs of mechanization services and agricultural inputs<br>• Poor public transports from isolated villages<br>• High exposure to environmental and other risks (floods, draughts, thefts) and lack of any type of insurance<br>• Lack of employment opportunities in rural areas<br>• Limited protection from abuses of local authorities<br>• Pro-large farm bias of the national government |

Source: Author's elaboration based on the author's survey and on Moldova Household Budget Survey data.

The first matrix refers to the endogenous objectives of peasants. As for natural resources, they own land, including large house plots, and can access water from the well; human resources include a large amount of underemployed family labour and strong cohesion among family members; the main financial resources to be invested in agriculture are remittances; experience in agriculture is often generation-old. Moreover, diversification of farm output, together with diversification of income and limited monetary needs for current expenditures and market-purchased goods, increase their resilience. Instead, the lack of agricultural equipment, storage facilities and of private transport means hinders family farms. Moreover, human capital has serious shortcomings: resistance to external innovations prevents a more efficient use of labour, increasing its drudgery; the knowledge of food and agriculture-related legal provisions is poor; and young people emigrating from rural areas, since they tend to associate agriculture with backwardness.

As for the external environment, the strong interfamilial linkages represent an opportunity, which allows farmers to overcome the labour constraints in busy periods of the year through exchange of labour, and to implement door-to-door sales of their eventual surplus. The fact that people show a clear preference for homemade food, guaranteed by personal knowledge, and mistrust food and beverages purchased in shops, facilitates farm sales. The process of EU integration will generate improvements in the legal framework, increased opportunities of earning remittances in Europe, and attract more investments in the transport networks, which will ease commuting from the villages to urban areas for earning waged incomes, rather than moving to cities. On the other hand, Moldovans will gradually lose the opportunity to access the Russian labour market. Other threats linked to the economic environment are: the limited access to credit, the high cost of inputs and mechanization services, and the high exposure to environmental risks without any insurance. Finally, the institutional environment is very poor: although the level of taxation is low, semi-subsistence farmers can barely access State subsidies, and they have no protection against the abuses of local authorities, which often have strong linkages with large farmers. This is the result of an ill-concealed preference of the national government for large corporate farms.

**Table 29. SWOT analysis with regard to the objective of turning the farm into a viable agricultural business.**

| Strengths | Weaknesses |
|---|---|
| • Widespread land ownership and good soil fertility<br>• Inheritance of Soviet vineyards and orchards<br>• Generation-old experience in agriculture<br>• Availability of remittances for agricultural investments<br>• Surplus of family labour to be used in farm production<br>• Intergenerational cohesion of the family | • Unclear location of the big share and no immediate access to it<br>• Small land size and limited scale economies<br>• Desertion of many orchards after their privatization<br>• Lack of irrigation facilities in open fields<br>• Low level of mechanization and lack of storage facilities<br>• Lack of private means of transport<br>• Limited level of farm specialization<br>• Limited permeability to externally-generated innovation<br>• Limited knowledge of the farm-related legal framework<br>• Limited perceptions of the role of marketing<br>• Lack of expertize for applying for funding<br>• High average age and shrinking family size<br>• Emigration of the youth from rural areas |
| **Opportunities** | **Threats** |
| • Well-developed market of rented land<br>• Availability of funding by international donors for intensification projects<br>• Low level of taxation of agricultural activities<br>• Reduced need of marketing thanks to Soviet legacy<br>• Improved access to the EU market for exporting farm output<br>• Widespread presence of local open-air markets<br>• Improvement of transports networks by donors facilitates commercialization of farm output in city markets<br>• Improvement of rule of law thanks to EU support | • Limited access to purchased land for farm growth<br>• Competition with corporate farms for land access<br>• Limited availability of credit and high interest rates<br>• High costs of mechanization services and agricultural inputs<br>• High exposure to environmental and other risks (floods, draughts, thefts) and lack of any type of insurance<br>• No viable local market of agricultural labour<br>• Price volatility due to unsecure external markets<br>• Reduced access to the Russian market for farm output<br>• Limited purchasing power of Moldovan citizens<br>• Popular appreciation for homemade food and mistrusts for shops hinders commercialization through formal channels<br>• Fragmented producers confronting oligopsonies<br>• Pro-large farm bias of the national government<br>• Local institutions often captured by large farmers |

Source: Author's elaboration based on the author's survey and on Moldova Household Budget Survey data.

The second matrix refers to the objective of turning semi-subsistence family farms into viable agricultural businesses. Some of the points of strength highlighted in the previous analysis are not valid anymore, due to their limited relevance for a farmer aiming at marketing a large share of output (e.g. availability of the well in the house garden). Farm production would probably focus on the big share; therefore, the low level of mechanization, and the lack of storage and irrigation facilities, and of private means of transport become serious weaknesses. The small farm size, which hinders the exploitation of scale economies, is an additional problem. Moreover, limited farm specialization,

which was a point of strength for semi-subsistence farms, becomes a point of weakness. Finally, no awareness of the role of marketing and a limited expertise for applying for funding must be added to the factors related to poor human capital. As for opportunities, also potential commercial farmers will benefit from the improvements granted by EU integration, but they risk losing the important Russian market, where Moldovan products do not need almost any marketing, thanks to Soviet legacy; in addition, unsecure external markets cause price volatility. This threat is even more serious if taking into account the underdevelopment of internal market: interviewees who were trying to sell a share of output above the average unanimously pointed out at this issue. Indeed, the preference for homemade food becomes a threat when farmers want to market their production through formal channels. As for farm input, the lack of a viable labour market in villages hinders the production potential of farms that cannot rely only on family labour. Instead, in comparison with the previous matrix, opportunities such as international funding for intensification projects and a well-developed rental market for land need to be added. Finally, the institutional environment, displaying pro-large farm biases, represents probably the most serious threat for commercial family farms. They must compete with large corporate farms (which often keep strong ties with local institutions) not only for internal markets, but also for accessing land, given that the latter are leasing a large amount of it and the number of land sales is limited. Finally, unless political action is taken, the highly fragmented supply of small farms will have to confront powerful oligopsonies, especially for exporting their products, as pointed out even by the large farmer from Criuleni district.

The discussion of the two previous matrices showed that family farms confront different constraints depending on their prevalent goals. In particular, farmers who are interested in achieving a higher level of market integration, thus turning their activity into a viable agricultural business, have to compete with better-placed large corporate farms. Instead, semi-subsistence farms are simply neglected by institutions, although they represent a pillar of rural livelihoods and already have all characteristics allowing their resilience, starting from land property. Hence, an effective agricultural (and rural) development policy should start from the recognition of the role of family farms, regardless whether they are commercial or semi-subsistence, and include measures targeting these two groups separately. Lerman and Sutton (2008, p. 118) suggest that «Moldova should allow land to flow from large corporate farms to small individual farms, rather than in the opposite direction». This would both help achieving a farm structure similar to comparable market economies, like Portugal or Greece, and preserve family farms as a pillar of the rural economy.

## 6.3.    Policy Recommendations: Between Resilience and the Promotion of Viable Farm Businesses

This paragraph contains a number of policy recommendations aimed at increasing the wellbeing of Moldovan farming families. The term "wellbeing" is used here in a broader meaning than "social welfare", i.e. the net monetary gains deriving from policy implementation, and is linked to the endogenously-determined goals of farmers. Limited to smallholders interested in turning their farm into a viable agricultural business, their "wellbeing" can coincide with increasing the productivity and the level of commercialization. At this regard, international aid agencies are already providing several investment opportunities. Instead, for subsistence and part-time farms, it corresponds to achieving resilience in an intergeneration perspective. Overall, the final objective of these policies would be minimizing the population loss of Moldovan rural areas, for which the identification of a core group of potential commercial family farms is not enough, if the majority of rural dwellers do not see a future in their native village.

The addressees of these recommendations are the national government, the European Union as the main current international partner and donor of the country, international aid agencies involved in the national agricultural sector, and peasants themselves. Although the latter represent a sizeable electoral constituency, and rural dwellers account for the absolute majority of voters, there is no political party representing specifically the interests of the countryside opposed to urban areas, or those of smallholders opposed to large farmers. Urban electors tend to be mobilized based on ethnic issues, and vote according to the linguistic divide (either Romanian or Russian). The two main current governmental parties originate both from the PDAM, and draw a majority of their consensus from rural areas, but they

attract voters through the affiliation of local leaders and political nepotism, rather than by representing opposed interests. This circumstance explains why the government is «biasing its policies in favour of large farms» (Lerman and Sutton 2008, p. 101). Gorton and White (2003, p. 311) report that, just before the implementation of the NLP, not only technical agricultural experts feared losing their social role, but «there was also little support among the wider population for radical decollectivisation»: a study from 1997 showed that just 16% of rural dwellers wanted to start independent farming, while 42% preferred to continue with collective agriculture. However, this situation cannot be reversed, as the land reform is a delicate political issue, and the positions of the population have changed since then.

Ellis (1992) groups the agricultural policies for developing countries into eight categories, based on the influence they aim at exerting on inputs and outputs of the peasant farm system. Although Moldova is a clear "looser" of post-communist transition, which equates it to developing countries, there are several elements inherited from the Soviet period which differentiate them. Among these are: the clear definition of property rights on all national farmland, at least on paper, and a corresponding land rental market; a well-developed State apparatus and local administrations; the memory of a centrally-managed farm system, and a widespread experience of working in collective farming; the presence of large corporate farms led by Moldovan citizens; well-developed, although imperfect, internal markets of agricultural inputs and outputs, despite the low purchasing power of citizens. Therefore, not all policies measures listed by Ellis (1992) are relevant in the Moldovan case.

The most effective strategy in order to retain the population in rural areas, and to allow them to keep cultivating their plots even as a side activity, would be the diversification of rural economy. Indeed, at the moment, the number of non-farm job is very limited. However, this goal can be achieved only in the long-term through consistent investments. Due to the limited tax base, especially in the countryside, the national budget is too narrow to implement an effective development policy without the intervention of foreign investors and international aid agencies. However, there are some growing economic sectors. One of them is real estate in the capital: as demonstrated by the survey, a large number of respondents, especially recipients of remittances, strive for buying an apartment in Chișinău. This tendency has created an escalation of prices and of constructions works, generating a bubble that could burst soon, due to the shrinking population. A similar situation is observed in the unstable banking sector of the country, where interest rates are extremely high (between 10% and 20%, even for accounts in foreign currency), and are not taxed. By shifting the tax burden towards real estate and the banking sector, and introducing exemptions for agricultural investors, the concentration of economic activities in the capital and the desertion of the countryside can be reversed, or at least limited. The increased tax burden (e.g. on second homes) would be much more effective than tax exemptions: the Republic of Moldova is currently one of the countries in the world with the largest number of free economic zones, but they have not proved effective in driving economic development of disadvantaged areas. Moreover, the decentralization of services and institutions could help revitalizing ageing local towns; e.g. moving some faculties of the Moldovan State University to the largest district capitals would bring more money there and help improving their cultural landscape. In order to limit the additional investment needs, duplications of the same services must be avoided, and the government could take advantage of the surplus of public buildings inherited from the USSR. All these policies imply the surrender of the pro-city bias by the government; since the majority of citizens live in rural areas, it would not be senseless.

A second strategy for limiting or avoiding the depopulation of rural areas consists in the improvement of transport networks and public transports. Since Moldova has a small area and almost no natural obstacles (rifts, mountains), a better transport network would allow rural dwellers, especially in the vicinity of the capital, to commute daily or weekly with a limited waste of time, and inhabitants of isolated villages to reach local markets of agricultural inputs and outputs in a shorter time, reducing transaction costs. International aid agencies are already implementing such policy, which should therefore go ahead, possibly verifying that future projects take into accounts the needs of the overall population and its distribution on the territory, rather than those of local strongpersons. The improvement of transport infrastructures is particularly needed in the South of the country, which lacks important urban areas.

The first category listed by Ellis (1992, p. 3) is that of price policies, i.e. «policies designed to influence the level and stability of the prices received by farmers for *farm output*». The interview with the large farmer from Criuleni district drew attention to the presence of oligopsonies in the export market. Only a few private companies hold the governmental licence for exporting industrial crops (sunflower seeds) and cereals; agricultural producers are forced to sell their output at the prices set by them, which in turn are able to extract large profits without contributing to the State budget. Export of agricultural products must be liberalized, moving the quality controls at farm level, and tax collection at the national border. Although this kind of policies may seem out of the scope of this dissertation, since they involve mostly large export-oriented farms, if the land is allowed to flow from the latter to middle-sized family farms, the issue of a fragmented supply confronting oligopsonies would be even more urgent. Indeed, due to the low purchasing power of Moldovan citizens, commercial family farms would not be able to earn consistent profits on the internal market, and they would have to rely on external ones, at least in the short-term. Moreover, the survey showed that Moldovan farmers benefit of the positive perception of their agricultural products by CIS consumers, thanks to the memory dating back to the USSR. While this capital should not be wasted because of political misunderstandings, Moldovan producers must search for alternative, more secure markets, which can be accessed more easily in comparison with the EU one. At this purpose, the government should implement a "branding" strategy for the country: a path that is already followed with the support of international donors. Finally, open access to the EU market (a natural goal, given the position of the country at the border of the EU), should remain a strategic goal of the national government. As the case of walnuts shows, this can bring benefits also to small semi-subsistence farmers, as long as products that do not require in-depth quality controls are concerned. However, Moldovan producers should be aware that they have to compete with countries that are much better placed in the Moldovan sectors of specialization (e.g. Italy and France for wine, Poland for apples, etc.), and that EU policy makers are probably more interested in the only resource in which the country has a real comparative advantage: cheap manpower.

The second category of policies concerns marketing, i.e. «the transfer of *farm outputs* from the farm gate to the domestic consumer, or to port of exportation» (Ellis 1992, p. 3). Three of the main objectives of this policy are «to protect farmers or consumers from parasitic traders», «to reduce the marketing margin» (i.e. the gap between consumer and producer prices), and «to improve quality and minimum standards» (Ellis 1992, p. 101). The third objective, although paramount, implies sizeable investments by farmers and, as pointed out by the rural development manager of the EU delegation, family farms will either move towards pure subsistence or turn into viable commercial businesses based on their capacity of implementing these standards. For this purpose, external loans are available. Provided that farmers are able to comply with the new food standards, the issue of fragmentation needs to be addressed. The high level of corruption and bureaucratization advises against the creation of large parastatal organizations. Given the importance of personal ties for creating confidence among people, the two most effective instruments are «farmer cooperatives» aiming at «undertaking the primary procurement (assembly) stage of marketing, for onward delivery to licensed processors or to designated parastatals», and «trade licensing», where the state «tries to control the private trade by licensing designated enterprises or individuals» (Ellis 1992, p. 102). As for cooperatives, on the one hand, they would be difficult to create due to the mistrust of the people, who fear losing the only asset they own for a worst-case scenario, like in the USSR; on the other hand, many producers, especially those in their late adulthood, have a positive memory of the *kolkhozes* and would be ready to give up a part of their autonomy in exchange for more economic security, as long as they can keep the property of their land. The national government should favour this kind of organizations by means of tax incentives and by empowering local people, rather than by direct intervention. As for trade licensing, a successful example was observed in Clişova, where an enterprising private citizen was empowered by a firm of collecting milk from local cow breeders. This model could be replicated for other products (e.g. vegetables, fruit, etc.) and in other villages. The public sector, or private company, could then incentivize the compliance of suppliers to food quality standards by means of periodic random controls.

The third policy category deals with inputs, aiming at «influencing the prices and delivery systems of purchased *variable inputs* used in farm production» (Ellis 1992, p. 4). This policy is related with the provision of agricultural equipment, as mechanization services account for the highest share of costs among middle and large family farms; this issue will be dealt with more in-depth later. The decomposition of farm costs shows that seeds and seedlings, and animal feed represent by far the largest expenditure for small semi-subsistence family farms. The input of fertilizers and pesticides is very low, so that there is a considerable margin for increasing productivity. However, the «farm resource misallocation problem» should not be underestimated: this includes «excessive use of an input», and «inefficient substitution of scarce for abundant factors of production (e.g. substitution of a subsidized weedicide for weeding labour)» (Ellis 1992, p. 132). The survey highlighted that weeding is the most time-demanding activity, that is implemented by mobilizing the entire family, or by taking advantage of interfamilial relations. Eliminating these tasks and relationships by means of chemical weedicide input would cause more damages than benefits: less opportunities for meeting with relatives and neighbours, more free time that cannot be invested in alternative tasks as long as the rural economy is not differentiated. The resulting condition of anomie risks increasing even further social problems like alcoholism. Therefore, provided that the input policy would be the main intervention aimed at subsistence farmers, the basic criterion is to start from the current expenditure structure, which is dictated by their most urgent needs, rather than trying to modify it. First, the improvement of transport networks will allow farmers to reach input markets more easily; however, many old people, and families without a private means of transport are overcoming this obstacle by relying on interfamilial networks. Due to underfunding of agricultural extension services, local authorities could be empowered with distributing farm inputs, thus reducing transaction costs for families. However, this requires excellent organizational capacities and high investments; therefore, such actions can be more successful if they are implemented as local, specifically targeted initiatives. The issue of input costs remains. In order to control input prices, a large network is needed, and the Moldovan State lacks financial and human resources; therefore, input subsidization is the best solution. This could take the form of a monetary refund by local authorities against the submission of a receipt, which would allow, at the same time, the emergence of many taxable informal transactions; or the form of a lump sum calculated on the area of farmed land, thus disincentivizing land abandonment. However, a cap on the refund should be set: e.g., in 2013, based on HBS data, over three quarters of farmers spent less than 1,500 MDL.

The fourth category of policies addresses the issue of credit, i.e. «the provision of *working capital* for the purchase of variable inputs used in farm production» (Ellis 1992, p. 4). This is an extremely urgent problem, which can barely be solved by the national banking system, due to the low level of confidence it enjoys among peasants. They prefer to keep their money in cash, or to convert them into assets like farmland (if available), investment animals, or home equipment. Formal credit is available against high interest rates, which are even increased by village credit agencies due to the high transaction costs needed for supplying loans locally, and the high risk of such transactions. International aid agencies are the primary potential provider of investment loans for farm intensification; nevertheless, they tend to favour large projects, so that the majority of family farms cannot qualify. Priority should instead be given to small projects worth a few thousand Euros, like greenhouses, drop irrigation systems, planting small fruit orchards, opening small processing facilities, etc. The survey showed that there is a widespread desire of increasing the production of high value-added cultivations (mostly vegetables and berries), in order not only to fulfil the subsistence needs of the farm, but also to obtain a small marketable surplus. Credits provided by international donors in foreign currency would imply lower interest rates; moreover, compared to the provision of a few big loans, moneylenders would spread the risk, and also the potential social benefits. However, a basic weakness of the Moldovan credit system is that it is «almost entirely supply driven»: rural credit agencies neither «encourage rural savings», nor «possess funds that can make them independent of central or external funding» (Ellis 1992, p. 163). This critical point could be addressed by incentivizing former migrants, or remittance recipients, to contribute to the capital of rural credit agencies, or to invest their money in farming, rather than in real estate. The case of Sărătenii Vechi shows

that local community ties provide the necessary information for implementing a successful leasing policy. For the purpose of incentivizing investments, a redirection of the tax burden towards urban sectors, temporary tax exemptions for investors, and the simplification of bureaucratic procedures for obtaining authorizations could be useful.

The author's survey showed that the heads of peasant farms are conservative and risk-adverse, and prefer "traditional" investments that allow obtaining at least a limited surplus. On the other hand, many young people associate agriculture with backwardness and, although they take for granted the provision of fresh agricultural and food products by their parents, are not interested in farming as a full-time activity. Apart from people whose parents established a viable agricultural business, an exception could be represented by the students of the State Agricultural University of Moldova or of the eight agricultural colleges whose parents run a "transitional" family farm, and who have not decided yet whether pursuing a farm-centred livelihood. International aid agencies that provide farm development loans should target this group, and business university students in general, since they are more open to innovation than their parents, and possess the necessary knowledge for preparing a business plan and filling an application. This could be done by advertising loan opportunities within educational institutions.

The fifth type of policy relates to mechanization, and includes all instruments that «affect the peace and direction of the adoption of mechanical technologies, or farm *fixed capital*, by farmers» (Ellis 1992, p. 4). As pointed out in the previous pages, the low level of mechanization represents an important constraint for farmers, and mechanization services are by far their largest cost. However, this subject should be addressed carefully, as «large machines such as four-wheel tractors or combine harvesters tend to accelerate the elimination of peasant farmers and their replacement by large-scale commercial family farmers», with the consequent «rapid rise in the proportion of rural dwellers who become landless agricultural labourers» (Ellis 1992, p. 189). Moreover, since mechanization is often *labour-saving*, «the loss of employment may relieve landless labourers of drudgery, but it clearly increases rather than reduces their suffering» (Ellis 1992, p. 181), causing problems of depression and alcoholism, as already pointed out when speaking of input policies. The average size of Moldovan farms is too small for subsidizing the purchase of four-wheel tractors and other large machines: their cost for peasants would be much less than their «opportunity cost for the society» (Ellis 1992, p. 186). Two alternative policies fitting the Moldovan context are the subsidization of mechanization services for subsistence farmers, especially the elderly, and the provision of loans for purchasing small agricultural machines to middle-sized farmers and young part-time ones. Like for variable inputs, the subsidy could take two forms: either a refund by local authorities against the delivery of a receipt, or a lump sum calculated on farmed land. Moreover, the refundable tasks (e.g. primary and secondary tillage, sowing of cereals and industrial plants) must be clearly defined, and a cap set. Differently from variable inputs, the distribution of expenditures presents a strong negative skewness, and a cap of 1,000 MDL would allow covering over three quarters of farmers. As for the purchase of small machines, the best suited ones, based on the survey, are rototillers, usable also in the vineyards. A third option would be the provision of loans directly to local authorities, which would purchase four-wheel tractors or other large agricultural machines in order to provide mechanization services to local family farms. They could either set a price equivalent to the average management costs of machines, including amortisation, or link the cost to the income of families, or try to earn a profit in order to invest it in public infrastructures, or in new machines.

The sixth policy listed by Ellis (1992, p. 4) is the land reform, which aims at «altering the ownership distribution or conditions of access to *land as a resource*». This policy has been already implemented in Moldova and produced the current distribution of land ownership; a new reform is not needed and would be politically unfeasible. However, a strong intervention on the conditions of access should take place, especially in marginal areas of the country. International aid agencies should use conditionality in order to force national authorities to strictly monitor the observance of land property rights in the villages, and avoid one-time missions: peasants would not risk their security by reporting the abuses of local leaders if they know that they will be left alone with latter the following day. Foreign

donors should install permanent missions and make sure that land certificates are distributed, and land plots physical identified and displayed to the owners. This is particularly urgent in the ethnically diverse districts of the South, where local leaders use to mobilize the population along ethnic divides in order to circumvent State controls: close collaboration with both Russia and the representatives of ethnic minorities at central level is the only viable option.

First, the land assumed the role of a social buffer, while State transfers and pensions are too limited to effectively address rural poverty; this situation will not change soon, due to a shrinking and ageing population. For this reason, the government should discourage land sales and rely on leasing as the main form of land consolidation. This would generate indisputable benefits in the long-term; indeed, a large percent of working age people migrated abroad, but they are either irregular workers, or not eligible for foreign pensions. Hence, they will probably come back home in their old age, and they will need some land to farm in order to survive. On the other hand, the short average duration of leasing contracts (three years) discourages the tenants from making long-term investments. The possibility of stipulating longer contracts without going to the city for meeting with a notary should be foreseen, provided that smallholders are allowed to have their land back in case of serious economic problems (long-term unemployment), or to opt for withdrawing it when they reach the pension age. This would help conciliating potentially opposite interests.

In general, the issue of access to land is part of the debate about the «*optimum farm size*, which is the area size of farm that minimizes average unit production costs» (Ellis 1992, p. 177). According to Lerman and Sutton (2008), the achievement of a land distribution similar to EU Mediterranean States would be the best solution for Moldova, while the national government favours large, heavily-mechanized corporate farms, and most projects promoted by international aid agencies go in the direction of farm growth, rather than intensification. However, if the final goal is the maximization of the agricultural export potential (as population shrinkage will further reduce the internal market), the most effective strategy would be to empty the country of people, and replace them with modern imported tractors. This is even truer for Moldova, since the territory lacks natural resources that could induce the development of other economic sectors. Differently from land concentration, farm intensification, and the consequent increase in productivity, would allow a wider redistribution of the benefits of agricultural development, without undermining the national export potential. Moreover, previous farm growth and consolidation programmes were not successful due to lack of confidence and limited participation of farmers (Cimpoieș 2010).

It is worth mentioning the program of Chayanov for «increasing agricultural labour productivity whereas safeguarding the principle of a fairer allocation of national income among the categories that contribute to its formation» (Segré 1994, p. 93). This included «a legal framework that, while maintaining the property of land, impedes all land transactions», so that «sales could be made only by the State»; «a land tax system foreseeing a higher taxation for large properties […] in order to favour the sales of land to the State»; «the possibility for the State to dispossess large proprietors, against compensation, for public needs»; «the establishment, with the land dispossessed or purchased by the State, of a land reserve to be used for structural reforms, […] aimed at being leased to peasants» (Segré 1994, pp. 94-95). These provisions would allow solving many of the issues mentioned above as for Moldova. The Land code included similar dispositions, like the initial ten-year moratorium on land sales, and the land reserve to be used for social needs. Land taxes are not an issue in Moldova, especially for smallholders; however, in case of financial needs, a progressive land tax would be an effective strategy to collect resources and prevent tax evasion. Despite it is in line with current social needs, this program is clearly utopian, given the influence of large proprietors in politics.

Research policies represent the seventh category. They aim at «the generation and diffusion of *new technology* designed to increase the productivity of resources in farm production» (Ellis 1992, p. 4); it includes both formal and informal research. The latter refers to the so-called «*indigenous technical knowledge*» (Ellis 1992, p. 220), which, despite its limits, allows resource-poor farmers to achieve resilience, but is often neglected by the formal research system. For this reason, Ellis (1992, p. 228) mentions the Farmer First Research model, which «envisages the supply and demand of innovations as a circular process beginning and ending with farmers», thus involving a continuous interaction. Such approach is the only viable option for overcoming the diffidence of an extremely conservative and

aged world. Children bearing direct on-farm working experience should be supported in their studies, even abroad, provided that they return to their villages to combine their knowledge with the expertise of old generations. National authorities and international donors should give priority to young people interested in studying agriculture, as this represents a strategic sector for the development of the country. They should be provided scholarships for studying abroad, on condition that they commit to come back to Moldova for applying their knowledge. The survey showed that the level of education in agriculture is high. Some agronomists were able to generate original low-cost income opportunities for their families. However, most of their technical knowledge is out of date, like the agricultural education system, hampered by a mismatch between the skills taught and those demanded by the labour market. E.g., the large farmer from Criuleni district stressed the difficulty of finding drivers and mechanics for tractors imported from Western countries, while many know Belarusian tractors very well (however, this issue does not concern small family farms). Recently, the EU-funded EUniAM project, which aims at consolidating the higher education system of Moldova, recommended the closure of the Agricultural University, whose branches should be included in other high educational institutions. Apart from the financial issue, there is a lack of young, internationally trained teachers; the resulting negative image is reflected in the declining number of students. Inverting this trend should become a key goal of national authorities and international donors.

The last category of policies listed by Ellis (1994, p. 4) address the issue of irrigation, i.e. «the provision of *water as a resource* in farm production, often involving large-scale public investment in the *infrastructure*». As explained in the fourth chapter, the NLP neglected the issue of management of irrigation facilities, which thus fell into disrepair. The Moldovan government lacks the resources to address this issue, and must rely on foreign donors. However, irrigation installations require high additional management costs that cannot be borne by small farms, e.g., if they have to purchase the pipes to take the water to their fields. Such infrastructure ends up favouring land concentration. The provision of loans for purchasing small electric pumps to extract the water from the well fits the needs of small farmers better; large and middle-size ones can use bigger gasoline engines transportable with tractors, provided that a river or well water is available at a short distance from their plots.

The policy recommendations listed in the previous pages were not grouped according to the type of family farm and the prevalent goals of its members, although some of them are specifically aimed either at increasing commercialization, or at guaranteeing the survival of poor social categories. Indeed, the agricultural sector, and rural areas in general, are complex systems where large corporate businesses, market-oriented family farms, and semi-subsistence ones interact with each other and the external environment, up to the international market. Family farms themselves should be understood as «a subject creating its own existence» (Chayanov 1966, p. 118). The "transitional farm" category is the clearest sign of it: many land recipients have been working in agriculture due to particular socioeconomic circumstances, but the issue whether transferring their activity to the next generation has not been solved yet; therefore, a large set of policies needs to be offered them.

Finally, policy formulation and their transposition into law by the parliament is relatively easy, especially if they allow accessing international funds. Instead, implementation is complicated by the fact that the Moldovan State is very weak for Western European standards, and is not able (or willing) to effectively control peripheral areas, also because of the connections between national politicians and local strongpersons. This framework is further complicated by the competition between the EU and Russia, and by the involvement of several international aid agencies.

# 7. Conclusions: An Assessment of Current Conditions and Future Scenarios

This dissertation dealt with the phenomenon of family farming in the Republic of Moldova. It tried to approach it as a paramount, constitutive sector of Moldovan society, rather than as a residual one, destined to disappear due to the integration of rural areas in the modern market economy. The Republic of Moldova represents a peculiar case for several reasons. Indeed, this territory did not follow the path from traditional societies to capitalism observed in Asian and African developing countries. Instead, peasant farming remerged at the end of the 1990s, after fifty years of socialist agriculture. This socioeconomic model of production and consumption integrated perfectly within the Moldovan society, allowing many families to overcome relatively safely the harshest period of economic downturn. The successful farmer, i.e. the farmer who is able to manage his house, and to feed the members of his family with homemade products, is considered the good housekeeper *par excellence*. Moreover, a thick network of relations surrounds the farming household, encompassing also the members who left the village for working in the capital or abroad. Despite their fundamental social role, family farms did not manage to become the drivers of the economic development of the country. The post-Soviet political leadership, made up for a large part by the managers of former collective farms, chose *by default* to maintain the orientation of the national agricultural sector toward external markets. Large corporate farms replaced *kolkhozes* and *sovkhozes* and kept producing for exporting, only without redistributing their profits to the population at large. Internal markets remain underdeveloped, while family farms guarantee the survival of a net majority of the inhabitants, using the large surplus of labour force. Indeed, export-oriented farms cultivate extensive crops (cereals, oil seeds) using high-mechanization, labour-saving production methods. Underemployment is widespread, which resulted in huge migration flows. However, within the given context, exporting cheap manpower and importing high level foreign technology is the most efficient strategy for maximizing the export potential. This happens despite small and middle-size family farms are much more efficient in producing agricultural output, and a farming sector based on them would allow a wider redistribution of profits. As long as the external markets are supplied by large corporate farms and internal ones remain underdeveloped, there is no margin for developing a large number of new small commercial farms, apart from those which are already operating.

The key issue is, therefore, the political will. Due to the distortion inherited from the USSR, the national political leadership has a preference for large corporate farms, and seems to believe that the country can achieve long-term growth by developing other economic sectors. However, Bessarabia lacks political stability and natural resources different from land. The boom of the service sector in Chișinău will soon reach a limit, due to shrinkage and ageing of the population. This bias against small farms, and against agriculture in general, is reflected in a growing number of young people who abandon their village, since they associate farming with poverty and backwardness. Many of them, provided that they did not migrate abroad, keep receiving fresh food from rural areas. The Moldovan political *élite* did not develop any long-term concept of the country they want to build. It is not clear whether the final goal of agricultural development policies is to supply external markets, or to guarantee a decent life level to the majority of the population within their country. In the second case, the natural instrument would be family farming, thanks to its wide spread, and its connection with the territory and its culture.

Since 2005, the Republic of Moldova has been pursuing a foreign policy oriented toward the West, whose major achievement is the signature of an Association Agreement with the European Union in June 2014. This implied a progressive redirection of trade flows from Russia and the CIS towards the EU. However, while the country holds a comparative advantage in the former region thanks to the memory of the Moldovan SSR supplying food products to the entire Union, the EU market is not immediately accessible to Moldovan exports because of strict food safety regulations, different consumer preferences, and the competition with better-placed Member States. The main benefit of the integration within the EU economic and juridical space will definitely be the improvement of rule of law. However, this will not automatically convert into an increased wellbeing for the population as a whole. A majority

of people will not be significantly affected by the fact that national agricultural output flows to the EU market rather than to the CIS, and respect stricter food safety standards. The most urgent problem is not one of external orientation, but rather of internal distribution of national resources.

Despite the generational gap and the progressive ageing of rural population, the peasant farms generated by the land reform proved much more resilient than the designers of the latter would have expected. The land market was not able to produce a more efficient distribution of land ownership, overcoming its extreme fragmentation. Most of the adjustments took place by means of leasing, whose beneficiaries were often people who occupied a favourable position in the rural communist apparatus. Nevertheless, consistently with what was observed by reformers as for the small household plots in late Soviet times, families were, indeed, more efficient than large farms in producing agricultural output in the following years. Land did not flow to commercial farms for two main reasons: it became an essential social buffer for vulnerable people during transition, and it represents a factor of family self-reward and social appraisal.

Currently, pure subsistence farms are the relative majority of Moldovan family farms. Since the State lacks the resources for building an effective welfare system, these need to be supported, so that they can continue absolving their function of social buffer. Commercial farms are a small minority, and although their heads show a great ability of implementing low-cost solutions for improving their situation, they will be seriously put to the test by the introduction of EU food quality standards. Among them, those which chose extensive cereal and oil seeds cropping are less profitable and not always allow the family to escape poverty. Then, part-time farming is the only opportunity for urban and suburban dwellers who received small land shares, and for young people who did not work in Soviet times and were not entitled to them. The large number of part-time farms proves that agriculture bears an important cultural and psychological value in itself for Moldovan citizens. "Transitional" farms are the most interesting category, as their evolution will determine the future of the Moldovan agricultural sector, and of rural areas as a whole.

The most dramatic changes as for land consolidation will probably take place when the largest cohorts of people who worked in the USSR, and are currently in late adulthood, start dying, releasing a large amount of land, which their children will be free to farm or to sell. Then, transitional farms inherited by young people interested in a farm-centred livelihood will transform into commercial farms; those inherited by young people who pursue a non-farm centred livelihood will regress to part-time farms through the sale of a part of their land (usually the big share); and those inherited by permanent emigrants, or by people lacking any interest in farming will probably disappear due to desertion or sale of all their land. The life choices of the youth will be influenced by the overall socio-political framework. If Moldovan citizens and their representatives retain that their country deserves to become more than a mere provider of low value-added crops to international markets, action should be taken with the assistance of international aid agencies.

Based on the present conditions, and the dynamics of the market, the following scenario may be foreseen. Pure subsistence farms headed by vulnerable social categories will disappear with them during the next years. Marginal land will be abandoned; good farmland will be acquired by large farms. Only unsuccessful returning migrants, and people who remain unemployed in their late adulthood will, probably, rely on this type of economic activity in the future, provided that they did not sell their land before. The rural population will keep decreasing and many villages become deserted, while Chișinău and its suburban localities will keep growing, at least in the short-term. As a result, a larger number of part-time, hobby farms will appear in the surrounding region: commuters and city workers will keep farming some land, due to the social value still attached to this activity. The number and the distribution of this type of farms depends on the number of viable jobs the urban economy will be able to generate, and on how far the current development projects will manage to improve the transport network of the country. Finally, a limited number of middle-size commercial family farms will keep operating in rural areas, supplying mainly local markets. The size of this third group depends on how many children of "transitional" farmers decide to turn their parents' farm into an agricultural business. The external market conditions, i.e. whether external trade will be liberalized, and the

competition with large corporate farms for accessing land at local level will determine whether their number will be enough to support a decent amount of rural dwellers.

The phenomenon of family farming in EU Eastern Partnership countries (Armenia, Azerbaijan, Belarus, Georgia, the Republic of Moldova, and Ukraine) deserves further investigation in the following years. Indeed, the renovated involvement of the EU in this area will determine great changes and opportunities. A first challenge is represented by the estimation of a full agricultural household model, in order to assess the elasticity of farm output with regard to prices and other variables. Second, the financial constraint deserves a focus, in order to evaluate whether farm production is actually constrained, and whether a determined intervention on the credit market can really make a difference. The issue of the investment of remittances in agriculture is a decisive one for the development of viable commercial and semi-commercial family farms. Finally, the distribution of land ownership in the long-term could be investigated by means of additional, innovative instruments, like agent-based models, which would allow policy makers to simulate the impact of alternative measures on the behaviour of small farmers, taking into account both the complex interactions among them, and the influence of the external environment.

# Appendix

## A. Questionnaire of the Author's Survey

## Questionnaire for Moldovan farmers

Dear respondents, this survey will help a PhD candidate, enrolled at the Faculty of Economics, specializing in agricultural and rural development, to study Moldovan family farms. The results will be examined anonymously, will not be communicated to public institutions or private companies, and will not be used for commercial purposes. Aggregated results will be used for proposing a number of effective agricultural and rural development policies. If you are interested, you can have a digital copy of the final thesis, or a printed summary. If you decide to include your name in the questionnaire, we are going to mention you in the acknowledgments section of the final thesis. Thank you in advance for your help.

**I.** The questionnaire was filled on the date ☐ / ☐ /2015, time: ☐ : ☐ .

**II.** In which village (town) is your household (farm) situated? ☐ , district /city-district/ATU Găgăuzia ☐ .

**III.** In which year did you start working in your own household (farm)? ☐ .

**IV.** Fill the following table with data regarding the composition and characteristics of each member of your family.

| Relationship with the family head | Gender (M/F) | Age (years) | Domicile* | Level of education in agriculture** | Months of work in farming (1-12) | For those who have a job outside agriculture | | | Do you have a pension? | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Occupation*** | Months/year | Hours/week | | |
| Head of the family | | | | | | | | | Yes | No |
| (2) | | | | | | | | | Yes | No |
| (3) | | | | | | | | | Yes | No |
| (4) | | | | | | | | | Yes | No |
| (5) | | | | | | | | | Yes | No |

\* Prevalent domicile during the last 12 months: (1) In the village, (2) in a town, (3) abroad (specify the country of emigration). \*\* (1) Without education; (2) Vocational education; (3) Special secondary education; (4) Higher education. \*\*\* Specify present profession.

**V.** Please, choose an option for each statement below. The chosen option should represent only your own opinion.
The options are: (1) Totally disagree; (2) Mostly disagree; (3) Mostly agree; (4) Totally agree.

| Statements | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| 1. A person is a good householder only if he/she produces most of the food his/her own family needs. | | | | |
| 2. I think it is better to buy food than to produce it. | | | | |
| 3. I work in agriculture because it allows me to have a good profit. | | | | |
| 4. I do not like at all working in agriculture. | | | | |
| 5. The main reason why I work in agriculture is that it allows me to provide food to my relatives who are living in the city. | | | | |
| 6. Today agriculture is the basis of Moldovan tradition. | | | | |
| 7. The main reason why I produce my own food is that my children or relatives, who are living in the city, cannot survive without it. | | | | |
| 8. The main reason why I work in agriculture is that I have no other option. | | | | |

| | | | | |
|---|---|---|---|---|
| 9. For the development of the country, the government should create more jobs in the industrial sector than in other sectors. | | | | |
| 10. Without the food produced in my own farm, my family would not have enough resources for surviving. | | | | |
| 11. I work in agriculture because my ancestors have worked in agriculture. | | | | |
| 12. The products purchased in stores (supermarkets) are safer than those purchased from farmers, because they pass a safety inspection. | | | | |
| 13. The future of the country is in agriculture. | | | | |
| 14. Our children are happy to help us with the work in agriculture. | | | | |
| 15. Farm products are always better than those purchased at the market or in shops. | | | | |
| 16. For my family, farming is a good business. | | | | |
| 17. If I had a bigger income (salary or pension), I would give up my work in agriculture. | | | | |
| 18. (→ Excluded pensioners) If there were better transport infrastructures, I would look for a job in town, but continue living in the village. | | | | |
| 19. If someone offered me a good sum, I would sell the farmland that I do not need for my family consumption. | | | | |
| 20. I try to produce more than my family needs, because I want to sell the extra production. | | | | |
| 21. We are producing only the necessary for our family, because we prefer to rest than to produce more. | | | | |
| 22. I think agriculture is an exhausting activity. | | | | |
| 23. Even if I had a bigger income, I would continue to work in agriculture in my free time. | | | | |
| 24. Land should never be sold. | | | | |
| 25. Agriculture makes people healthier. | | | | |
| 26. Agricultural products are the only thing in the word, which Moldova can be proud of. | | | | |
| 27. Life quality is higher in Chișinău than in my village/town. | | | | |
| 28. People who abandon their land should either be fined, or dispossessed of their land for giving it to other people. | | | | |
| 29. I go to live in the city if I find a well-paid job there. | | | | |
| 30. I hope my children will not work in agriculture but will find a job in other fields. | | | | |
| 31. If you do not produce your own homemade wine, you are not a good householder. | | | | |

**VI.** In the last 12 months, which was the share of self-produced food and purchased products in total consumption of your family? (→ Select only one option)
☐ Self-produced food was more than 50%; ☐ purchased products were more than 50%; ☐ they were approximately the same quantity.

**VII.** Which was the share of income from selling farm products and from other activities (jobs, pensions) on total family income in the last 12 months? (→ Select one option)
☐ Income from selling farm products was more than 50%; ☐ other incomes were more than 50%; ☐ they were approximately the same quantity.

**VIII.** Now we will speak about land areas. Please, fill the following table (hectare, ares).

| Types of land ownership | 1. Of your property | 2. Leased | 3. Rented-in |
|---|---|---|---|
| a. House garden (without the constructed surface) | | | |
| b. Orchards | | | |
| c. Vineyards | | | |
| d. Arable land (small and big shares) | | | |
| Total (a+b+c) | | | |

**IX.** How is the rent of farmland paid in your locality? (→ select one option and specify the amount)

☐ In money (▢ MDL/ha); ☐ in kind – fixed harvest share (▢ %); ☐ in kind – fixed harvest value, equal to ▢; ☐ in a different way (▢).

**X.** Would you sell your land if someone offered you a good price for it (a price you consider as the real value of your farmland)? (→ select one option)
☐ Yes, all the land I own; ☐ yes, only the land I do not cultivate; ☐ no, in any case.

**XI.** (→ If the family does not have any child, go to question number **XII**) Are your children (at least one of them) interested in working in agriculture at the moment?
☐ Yes; ☐ no.

**XII.** Do you have relatives (apart from your children) who will inherit/take care of your land when you will stop working it?
☐ Yes; ☐ no.

**XIII.** Now we will read a list of agricultural or processed products. For each product, please tell us if you cultivated/produced them in the last agricultural year (12 months). For each cultivated product, please indicate the surface you used (if you used multiple cropping select the box "between rows"), total production, and what percentages were used either for self-consumption, sales, animal feed, or as a present. For each sold product, indicate the unit price.

| Agricultural products | Surface | | Trees | Production (kg or litres) | Type of use (%) | | | | Unit price (MDL) |
|---|---|---|---|---|---|---|---|---|---|
| | Hectare, ares | Rows | | | Self-consumption | Sales | Animals | Present | |
| Wheat | | Yes | | | | | | | |
| Corn | | Yes | | | | | | | |
| Other cereals* | | Yes | | | | | | | |
| Industrial crops** | | Yes | | | | | | | |
| Legumes*** | | Yes | | | | | | | |
| Potatoes and carrots | | Yes | | | | | | | |
| Onion and garlic | | Yes | | | | | | | |
| Tomatoes and cucumbers | | Yes | | | | | | | |
| Other vegetables**** | | Yes | | | | | | | |
| Watermelons, melons and pumpkins | | Yes | | | | | | | |
| Apple, pear, plum trees | | Yes | | | | | | | |
| Cherry, black cherry-trees | | Yes | | | | | | | |
| Apricots, peach trees | | Yes | | | | | | | |
| Walnut trees | | Yes | | | | | | | |
| Strawberries and berries | | Yes | | | | | | | |
| Other plants | | Yes | | | | | | | |
| Vines (grape) | | | | | | | | | |
| Wine (litres) | | | | | | | | | |
| Liquor or homemade alcohol (litres) | | | | | | | | | |
| Canned juices (litres) | | | | | | | | | |
| Jam | | | | | | | | | |
| **Abandoned land** | | | | | | | | | |

* Barley, etc.; ** Tobacco, sugar beet, sunflower, rapeseed, soy, etc.; *** Beans, peas, lentils, etc.; ****Cabbage, red beet, pepper, radish, eggplant, etc.

**XIV.** Please, tell us, for each animal type, the number you own now, and how many of them you slaughtered (for consumption or for sale) during the last 12 months.

| Animals | Cattle (cows) | Sheep | Pigs | Goats | Hens, chickens | Ducks | Geese | Other poultry | Rabbits | Bee fami-lies | Horses | Other (specify) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alive now | | | | | | | | | | | | |
| Slaughtered in the last 12 months | | | | | | | | | | | | |
| Sold – slaughtered or alive (kg) | | | | | | | | | | | | |
| Total monetary income (MDL) | | | | | | | | | | | | |

**XV.** Now we will read a list of animal products. For each of them, please tell us if you have produced it in the last 12 months. Indicate the total produced quantity and the percentage you sold. For each product, specify if you gave some of it to your relatives or friends. For each sold product, indicate the unitary price.

| To be filled if you own: | Animal products | Production (kg) | Sold (%) | Present? | Unit price (MDL) |
|---|---|---|---|---|---|
| - pigs | Sausages and other meat products (e.g. lard) | | | Yes | |
| - cattle (cows) | Not processed milk (litres) | | | Yes | |
| | Cheese (*brânza* and *cașcaval*) | | | Yes | |
| | Sour cream | | | Yes | |
| - sheep or goats | Wool | | | Yes | |
| | Not processed milk (litres) | | | Yes | |
| | Cheese (*brânza*) | | | Yes | |
| - cattle | Cattle leather (pieces) | | | Yes | |
| - bees | Honey | | | Yes | |
| - poultry | Eggs(pieces) | | | Yes | |
| - animals | Other products | | | Yes | |

**XVI.** How often do you give agricultural or processed products to your relatives/friends who live in the city? (→ select one option)

☐ Every week; ☐ several times a month; ☐ once a month; ☐ more rarely; ☐ never.

**XVII.** (→ If the household does not sell agricultural products, go to question number **XVIII**). How do you proceed when you want to sell your products? (→ select one or more options)

☐ People look for me at home and ask for my products; ☐ I look for people and offer them my products; ☐ a company comes to collect my products; ☐ I bring them to a company's seat; ☐ I have a space in the market; ☐ I bring my products to a person who sells them (for example: at the market).

**XVIII.** Now we will speak about work in the agriculture. Please specify how many working days, in the last 12 months, did you use for the following activities.

| Type of activity | Ploughing/hoeing | | | Seeding | | Weed removal | | | Pruning** | Harvesting | | Grape harvesting | Collecting grass | Animal care (hours/day) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | garden | land | vines | garden | land | garden | land | vines | | garden | land | | | |
| Manually/by machine* | | | | | | | | | | | | | | |
| Family working days | | | | | | | | | | | | | | |
| Paid working days | | | | | | | | | | | | | | |
| Not paid days (exchange) | | | | | | | | | | | | | | |

\* Specify the machine type (tractor, rototiller, seeder, combine); \*\* of vines and fruit trees.

**XIX.** Which is the daily/hourly agricultural wage in your village? ☐ MDL/hour or ☐ MDL/day

**XX.** If someone helped you free, or you helped someone without being paid, in which relation are you with these people? (→ select one or more options)
☐ Relatives from the village; ☐ relatives from outside the village; ☐ friends from the village; ☐ friends from outside the village; ☐ neighbours (not friends).

**XXI.** Now we speak about entries. Please, fill the table by specifying how much you spent for each entry.

| Entries | Total expenditures (or prices and quantities) | Notes |
|---|---|---|
| Animal feed | | |
| Seeds and seedlings | | |
| Manure and fertilizers | | |
| Anti-parasite products | | |
| Irrigation water and electricity | | |
| Fuel and maintenance of own agricultural machines | | |
| Other ( ) | | |

**XXII.** Now we will speak about agricultural equipment and means of transport. Please, fill the table by specifying which machines, agricultural equipment and means of transport you own, their number, if you paid for mechanization services, and the relative expenditure.

| Machines and means of transport | Number owned | Tasks fulfilled with it | Expenditure for mechanization services |
|---|---|---|---|
| Tractor | | | |
| Plough | | | |
| Rototiller | | | |
| Seeder | | | |
| Combine | | | |
| Grinder | | | |
| Grape press | | | |
| Animal wagon | | | |
| Trailer | | | |
| Car (used for transporting goods) | | | |
| Truck | | | |
| Other ( ) | | | |

**XXIII.** How do you usually reach your land plots? (→ select one or more options)
☐ By car; ☐ by motorcycle; ☐ by bicycle; ☐ by truck; ☐ by public transport; ☐ by animal wagon; ☐ on foot; ☐ other ( ).

**XXIV.** How do you usually reach the closest agricultural and food market? (→ select one or more options)
☐ By car; ☐ by motorcycle; ☐ by bicycle; ☐ by truck; ☐ by public transport; ☐ by animal wagon; ☐ on foot; ☐ other ( ).

**XXV.** How long do you need to reach the closest agricultural and food market (consider only the travel time, including waiting time if you need to change means of transport, and the walking time)? ☐ minutes.

**XXVI.** Is it possible to make a round trip to the city with the public transport in one day? (→ select one option)
☐ Yes, I need only half a day or even less; ☐ yes, I need an entire day; ☐ no.

**XXVII.** Have you paid any of the following taxes in the last 12 months? (→ select one or more options)
☐ Land tax (☐ MDL); ☐ farm income tax; ☐ value added tax on marketed farm products; ☐ pension contributions on farm income; ☐ tax for a space in the market; ☐ grazing tax; ☐ other taxes (☐).

**XXVIII.** Have you invested remittances (money from abroad) in agriculture in the last 12 months?
☐ Yes; ☐ no.

**XXIX.** How often have you received remittances in the last 12 months? (→ select one option)
☐ Every month; ☐ more rarely; ☐ only in special occasions (weddings, funerals, construction works, etc.); ☐ never.

**XXX.** Have you taken any loans for agriculture in the last 12 months?
☐ Yes; ☐ no (→ If the answer is No, go to question number **XXXII**).

**XXXI.** What kind of loan did you take? (→ select one or more options)
☐ Bank credit; ☐ private loan; ☐ donation; ☐ other type of loan (☐).

**XXXII.** Which was the amount of the loan? ☐ EUR/USD/MDL.

**XXXIII.** If the government decides to give you a non-repayable loan of 1,000 EUR, on condition that you invest it in agriculture, how will you use it? (→ select one option)
☐ Long-term investment (specify: ☐); ☐ paying short-term expenditures (specify: ☐).

**XXXIV.** If you inherit, or somehow earn 50,000 EUR and you are free to invest them in any area you want, how would you use them? (→ select one option and specify)

**XXXV.** ☐ In agriculture (☐); ☐ in another business (☐); ☐ in real estate (☐); ☐ in another way (☐).

The questionnaire ends here. Thank you for your help. Goodbye and wish you a good day!

## B. Descriptive Tables

**Table 1A. Welfare and farm characteristics along farm size classes.**

| | 2007 | Small | Mid | Large | Test | 2010 | Small | Mid | Large | Test | 2013 | Small | Middle | Large | Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of active farms in the sample | 4,726 | 50.05 | 42.40 | 7.54 | NA | 4,252 | 54.78 | 39.31 | 5.91 | NA | 4,059 | 55.22 | 39.51 | 5.28 | NA |
| Corresponding farming population (1,000) | 2,376 | 1,056 | 1,101 | 220 | NA | 2,390 | 1,154 | 1,048 | 188 | NA | 2,348 | 1,191 | 1,000 | 158 | NA |
| Subsistence farms (%, a) | 73.12 | 77.77 | 69.87 | 61.34 | *** | 78.25 | 82.68 | 75.08 | 58.63 | *** | 74.16 | 79.97 | 69.24 | 50.49 | *** |
| Farms in the central territory (%, a) | 24.33 | 24.67 | 25.93 | 13.07 | *** | 25.60 | 27.64 | 23.58 | 20.18 | ** | 25.74 | 25.58 | 26.81 | 19.50 | . |
| Farms in urban areas (%, a) | 19.86 | 36.05 | 3.66 | 3.51 | *** | 21.14 | 35.25 | 4.20 | 3.11 | *** | 22.16 | 37.93 | 2.96 | 0.91 | *** |
| Poor farm households (%, a) | 42.30 | 45.19 | 38.49 | 44.53 | *** | 37.80 | 37.51 | 37.75 | 40.76 | | 31.10 | 30.68 | 31.08 | 35.77 | |
| Average household size (persons) | 2.77 | 2.46 | 3.03 | 3.40 | *** | 2.67 | 2.36 | 2.98 | 3.56 | *** | 2.46 | 2.26 | 2.65 | 3.14 | *** |
| Average age of household head (years) | 54.80 | 56.34 | 53.23 | 53.48 | *** | 55.80 | 57.44 | 53.92 | 53.05 | *** | 56.62 | 57.81 | 55.36 | 53.63 | *** |
| Female household head (%, a) | 36.68 | 43.04 | 31.96 | 21.05 | *** | 36.69 | 44.18 | 29.71 | 13.76 | *** | 38.95 | 46.79 | 31.03 | 16.14 | *** |
| Bad health status of the household head (%, a) | 24.13 | 25.83 | 23.11 | 18.65 | ** | 22.55 | 25.05 | 19.58 | 19.23 | *** | 21.38 | 23.53 | 19.38 | 13.96 | *** |
| Education of the household head is low (%, a) | 14.44 | 19.08 | 9.78 | 9.88 | *** | 12.09 | 15.46 | 8.36 | 5.67 | *** | 8.80 | 11.23 | 6.18 | 2.88 | *** |
| Education of the household head is high (%, a) | 20.58 | 22.72 | 18.67 | 17.12 | ** | 20.04 | 21.09 | 18.82 | 18.46 | | 19.70 | 21.85 | 16.59 | 20.48 | *** |
| Max education in the household is low (%, a) | 10.44 | 15.90 | 5.20 | 3.77 | *** | 8.41 | 11.87 | 4.71 | 0.98 | *** | 6.23 | 8.63 | 3.71 | 0.00 | *** |
| Max education in the household is high (%, a) | 30.76 | 30.93 | 30.35 | 31.96 | | 29.54 | 28.65 | 30.41 | 31.98 | | 30.37 | 30.34 | 28.72 | 42.96 | *** |
| Household with job seeker (%, a) | 11.67 | 10.18 | 12.87 | 14.76 | ** | 13.30 | 11.67 | 15.28 | 15.23 | ** | 10.19 | 9.19 | 11.45 | 11.26 | |
| Household with underemployment (%, a) | 27.12 | 22.55 | 30.69 | 31.17 | *** | 29.12 | 24.91 | 33.21 | 33.91 | *** | 22.29 | 19.36 | 24.39 | 34.81 | *** |
| Average household income (MDL) (b) | 36,161 | 32,453 | 39,100 | 44,236 | *** | 35,666 | 32,703 | 38,761 | 42,543 | *** | 36,685 | 34,409 | 38,979 | 43,338 | *** |
| Average per capita income (equ.) (MDL) (b) | 17,073 | 16,507 | 17,540 | 18,199 | * | 17,450 | 17,500 | 17,476 | 16,814 | | 18,922 | 18,909 | 19,037 | 18,198 | |
| Farm income (% of total family income, c) | 29.35 | 21.09 | 36.04 | 46.61 | *** | 19.43 | 13.64 | 24.68 | 38.15 | *** | 18.58 | 13.19 | 23.79 | 35.97 | *** |
| Earned non-farm income of the family (%, c) | 40.70 | 41.31 | 41.53 | 32.06 | *** | 43.89 | 42.22 | 46.80 | 40.13 | *** | 41.82 | 40.93 | 43.54 | 38.32 | . |
| Difficulty to pay for food (%, a) | 37.34 | 40.15 | 34.44 | 34.98 | *** | 40.51 | 41.96 | 38.91 | 37.74 | | 34.77 | 34.40 | 36.29 | 27.30 | * |
| Difficulty to pay for electricity (%, a) | 13.73 | 14.63 | 12.67 | 13.70 | | 19.10 | 18.95 | 19.31 | 19.06 | | 19.90 | 20.03 | 19.52 | 21.38 | |
| Average total land area (ha) | 1.612 | 1.032 | 1.960 | 3.506 | *** | 1.498 | 0.923 | 1.955 | 3.791 | *** | 1.385 | 0.869 | 1.791 | 3.734 | *** |
| - Owned share (%, c) | 99.32 | 99.85 | 98.75 | 99.04 | *** | 99.22 | 99.83 | 98.83 | 96.28 | *** | 99.32 | 99.89 | 98.80 | 97.24 | *** |
| - Rented-in share (%, c) | 0.68 | 0.15 | 1.25 | 0.96 | *** | 0.78 | 0.17 | 1.17 | 3.72 | *** | 0.68 | 0.11 | 1.20 | 2.76 | *** |
| - Leased share (%, c) | 30.84 | 32.51 | 33.89 | 2.62 | *** | 29.65 | 28.26 | 35.54 | 3.35 | *** | 28.17 | 27.88 | 31.93 | 2.96 | *** |
| - Available share (%, c) | 69.16 | 67.49 | 66.11 | 97.38 | *** | 70.35 | 71.74 | 64.46 | 96.65 | *** | 71.83 | 72.12 | 68.07 | 97.04 | *** |
| - Abandoned share (%, c) | 14.64 | 20.84 | 8.93 | 5.62 | *** | 17.41 | 24.27 | 9.63 | 5.67 | *** | 16.88 | 23.73 | 8.81 | 5.54 | *** |
| - Farmed share (%, c) | 54.52 | 46.65 | 57.18 | 91.76 | *** | 52.93 | 47.47 | 54.83 | 90.98 | *** | 54.95 | 48.38 | 59.26 | 91.50 | *** |
| Mechanization (own tractor) (%, a) | 2.07 | 0.38 | 1.92 | 14.11 | *** | 2.70 | 0.54 | 2.32 | 25.32 | *** | 2.37 | 0.67 | 2.33 | 20.53 | *** |
| Share of in-kind farm income (%, c) | 87.45 | 86.78 | 88.78 | 84.31 | *** | 88.51 | 88.82 | 89.37 | 79.90 | *** | 85.92 | 87.38 | 85.45 | 74.28 | *** |
| Land productivity (MDL/ha farmed) (b) | 28,413 | 39,541 | 19,218 | 6,249 | *** | 20,216 | 27,053 | 13,019 | 4,710 | *** | 19,539 | 25,833 | 12,747 | 4,541 | *** |

Source: Moldova Household Budget Survey. (a) Percentage of farming households presenting this characteristic out of total farming households in the group; (b) Monetary values in constant MDL at 2010 prices; (c) Average percentage among farming households in the group. Level of significance of the difference of means among groups: *** = 0.001; ** = 0.010; * = 0.050; . = 0.100.

**Table 2A. Welfare and farm characteristics along share of farm sales (subsistence vs. semi-commercial).**

| | 2007 | According to farm sales | | | 2010 | According to farm sales | | | 2013 | According to farm sales | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Subsist. | Semi-com. | Test | | Subsist. | Semi-com. | Test | | Subsist. | Semi-com. | Test |
| Number of active farms in the sample | 4,726 | 73.12 | 26.88 | NA | 4,252 | 78.25 | 21.75 | NA | 4,059 | 74.16 | 25.84 | NA |
| Corresponding farming population (1,000) | 2,376 | 1,692 | 650 | NA | 2,390 | 1,827 | 553 | NA | 2,348 | 1,703 | 638 | NA |
| Subsistence farms (%, a) | 50.05 | 52.51 | 40.82 | *** | 54.78 | 57.64 | 43.42 | *** | 55.22 | 59.39 | 42.68 | *** |
| Farms in the central territory (%, a) | 24.33 | 21.41 | 29.96 | *** | 25.60 | 25.54 | 24.90 | | 25.74 | 25.22 | 27.03 | |
| Farms in urban areas (%, a) | 19.86 | 23.64 | 17.28 | *** | 21.14 | 21.53 | 18.32 | . | 22.16 | 19.69 | 16.53 | . |
| Poor farm households (%, a) | 42.30 | 46.60 | 30.75 | *** | 37.80 | 40.63 | 27.69 | *** | 31.10 | 34.61 | 21.09 | *** |
| Average household size (persons) | 2.77 | 2.74 | 2.86 | * | 2.67 | 2.62 | 2.85 | *** | 2.46 | 2.42 | 2.60 | *** |
| Average age of household head (years) | 54.80 | 55.26 | 53.55 | *** | 55.80 | 56.30 | 54.01 | *** | 56.62 | 57.35 | 54.42 | *** |
| Female household head (%, a) | 36.68 | 38.35 | 31.84 | *** | 36.69 | 39.01 | 27.86 | *** | 38.95 | 42.19 | 29.46 | *** |
| Bad health status of the household head (%, a) | 24.13 | 26.24 | 18.38 | *** | 22.55 | 23.87 | 17.49 | *** | 21.38 | 22.39 | 18.20 | ** |
| Education of the household head is low (%, a) | 14.44 | 15.63 | 11.03 | *** | 12.09 | 13.67 | 6.57 | *** | 8.80 | 10.00 | 5.23 | *** |
| Education of the household head is high (%, a) | 20.58 | 19.65 | 21.89 | | 20.04 | 20.23 | 18.88 | | 19.70 | 19.79 | 19.57 | |
| Max education in the household is low (%, a) | 10.44 | 11.52 | 7.75 | *** | 8.41 | 9.63 | 4.20 | *** | 6.23 | 7.24 | 3.18 | *** |
| Max education in the household is high (%, a) | 30.76 | 29.78 | 32.12 | | 29.54 | 29.38 | 29.63 | | 30.37 | 29.77 | 32.34 | |
| Household with job seeker (%, a) | 11.67 | 11.63 | 11.69 | | 13.30 | 13.10 | 14.04 | | 10.19 | 9.20 | 12.80 | ** |
| Household with underemployment (%, a) | 27.12 | 26.90 | 28.32 | | 29.12 | 28.62 | 30.97 | | 22.29 | 20.71 | 26.83 | *** |
| Average household income (MDL) (b) | 36,161 | 34,097 | 41,356 | *** | 35,666 | 34,209 | 40,864 | *** | 36,685 | 34,998 | 41,639 | *** |
| Average per capita income (equ.) (MDL) (b) | 17,073 | 16,229 | 19,283 | *** | 17,450 | 16,956 | 19,109 | *** | 18,922 | 18,210 | 21,007 | *** |
| Farm income (% of total family income, c) | 29.35 | 24.71 | 43.49 | *** | 19.43 | 14.33 | 38.23 | *** | 18.58 | 12.63 | 35.88 | *** |
| Earned non-farm income of the family (%, c) | 40.70 | 42.51 | 34.92 | *** | 43.89 | 46.34 | 35.25 | *** | 41.82 | 43.54 | 37.03 | *** |
| Difficulty to pay for food (%, a) | 37.34 | 38.47 | 34.25 | * | 40.51 | 41.56 | 36.63 | * | 34.77 | 35.65 | 32.03 | . |
| Difficulty to pay for electricity (%, a) | 13.73 | 14.50 | 11.18 | ** | 19.10 | 18.68 | 20.39 | | 19.90 | 19.77 | 20.20 | |
| Average total land area (ha) | 1.612 | 1.546 | 1.866 | *** | 1.498 | 1.420 | 1.812 | *** | 1.385 | 1.261 | 1.754 | *** |
| - Owned share (%, c) | 99.32 | 99.39 | 99.09 | | 99.22 | 99.37 | 98.79 | . | 99.32 | 99.38 | 99.16 | |
| - Rented-in share (%, c) | 0.68 | 0.61 | 0.91 | | 0.78 | 0.63 | 1.21 | . | 0.68 | 0.62 | 0.84 | |
| - Leased share (%, c) | 30.84 | 31.13 | 31.51 | | 29.65 | 29.26 | 31.78 | | 28.17 | 27.61 | 30.12 | . |
| - Available share (%, c) | 69.16 | 68.87 | 68.49 | | 70.35 | 70.74 | 68.22 | | 71.83 | 72.39 | 69.88 | . |
| - Abandoned share (%, c) | 14.64 | 14.44 | 13.34 | | 17.41 | 17.84 | 15.14 | ** | 16.88 | 17.60 | 14.17 | *** |
| - Farmed share (%, c) | 54.52 | 54.43 | 55.15 | | 52.93 | 52.90 | 53.09 | | 54.95 | 54.79 | 55.72 | |
| Mechanization (own tractor) (%, a) | 2.07 | 1.29 | 4.29 | *** | 2.70 | 1.47 | 7.19 | *** | 2.37 | 1.26 | 5.61 | *** |
| Share of in-kind farm income (%, c) | 87.45 | 99.56 | 54.52 | *** | 88.51 | 99.78 | 47.94 | *** | 85.92 | 99.79 | 46.12 | *** |
| Land productivity (MDL/ha farmed) (b) | 28,413 | 26,435 | 35,245 | *** | 20,216 | 16,367 | 34,542 | *** | 19,539 | 16,601 | 28,216 | *** |

Source: Moldova Household Budget Survey. (a) Percentage of farming households presenting this characteristic out of total farming households in the group; (b) Monetary values in constant MDL at 2010 prices; (c) Average percentage among farming households in the group. Level of significance of the difference of means between groups: *** = 0.001; ** = 0.010; * = 0.050; . = 0.100.

**Table 3A. Welfare and farm characteristics according to farm location (distance from Chișinău).**

| | 2007 | According to location | | | 2010 | According to location | | | 2013 | According to location | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Centre | Periph. | Test | | Centre | Periph. | Test | | Centre | Periph. | Test |
| Number of active farms in the sample | 4,726 | 24.33 | 75.67 | NA | 4,252 | 25.60 | 74.40 | NA | 4,059 | 25.75 | 74.25 | NA |
| Corresponding farming population (1,000) | 2,376 | 616 | 1,760 | NA | 2,390 | 641 | 1,750 | | 2,348 | 632 | 1,716 | NA |
| Subsistence farms (%, a) | 50.05 | 50.76 | 49.83 | | 54.78 | 59.14 | 53.28 | ** | 55.22 | 54.87 | 55.34 | |
| Farms in the central territory (%, a) | 73.12 | 66.04 | 75.32 | *** | 78.25 | 78.68 | 78.10 | | 74.16 | 72.82 | 74.63 | |
| Farms in urban areas (%, a) | 19.86 | 22.95 | 18.87 | * | 21.14 | 26.66 | 19.25 | *** | 22.16 | 23.30 | 21.77 | |
| Poor farm households (%, a) | 42.30 | 32.71 | 45.38 | *** | 37.80 | 31.07 | 40.11 | *** | 31.10 | 26.99 | 32.53 | ** |
| Average household size (persons) | 2.77 | 2.96 | 2.71 | *** | 2.67 | 2.80 | 2.63 | ** | 2.46 | 2.58 | 2.42 | ** |
| Average age of household head (years) | 54.80 | 54.09 | 55.04 | . | 55.80 | 53.91 | 56.45 | *** | 56.62 | 55.35 | 57.06 | ** |
| Female household head (%, a) | 36.68 | 34.82 | 37.28 | | 36.69 | 37.31 | 36.48 | | 38.95 | 35.63 | 40.10 | * |
| Bad health status of the household head (%, a) | 24.13 | 24.62 | 23.98 | | 22.55 | 19.47 | 23.62 | ** | 21.38 | 21.44 | 21.37 | |
| Education of the household head is low (%, a) | 14.44 | 11.43 | 15.41 | ** | 12.09 | 8.01 | 13.50 | *** | 8.80 | 5.16 | 10.06 | *** |
| Education of the household head is high (%, a) | 20.58 | 22.15 | 20.08 | | 20.04 | 22.94 | 19.04 | * | 19.70 | 21.41 | 19.11 | |
| Max education in the household is low (%, a) | 10.44 | 7.58 | 11.37 | *** | 8.41 | 4.98 | 9.59 | *** | 6.23 | 3.77 | 7.08 | *** |
| Max education in the household is high (%, a) | 30.76 | 33.49 | 29.89 | * | 29.54 | 33.21 | 28.27 | ** | 30.37 | 33.38 | 29.32 | ** |
| Household with job seeker (%, a) | 11.67 | 11.77 | 11.63 | | 13.30 | 14.75 | 12.80 | | 10.19 | 13.83 | 8.93 | *** |
| Household with underemployment (%, a) | 27.12 | 28.68 | 26.61 | | 29.12 | 26.03 | 30.20 | * | 22.29 | 20.35 | 22.96 | |
| Average household income (MDL) (b) | 36,161 | 44,509 | 33,477 | *** | 35,666 | 42,052 | 33,469 | *** | 36,685 | 42,289 | 34,743 | *** |
| Average per capita income (equ.) (MDL) (b) | 17,073 | 19,606 | 16,259 | *** | 17,450 | 19,787 | 16,646 | *** | 18,922 | 20,918 | 18,230 | *** |
| Farm income (% of total family income, c) | 29.35 | 25.90 | 30.46 | *** | 19.43 | 13.93 | 21.32 | *** | 18.58 | 15.12 | 19.77 | *** |
| Earned non-farm income of the family (%, c) | 40.70 | 46.38 | 38.88 | *** | 43.89 | 54.68 | 40.18 | *** | 41.82 | 49.59 | 39.13 | *** |
| Difficulty to pay for food (%, a) | 37.34 | 44.37 | 35.08 | *** | 40.51 | 41.51 | 40.17 | | 34.77 | 34.35 | 34.92 | |
| Difficulty to pay for electricity (%, a) | 13.73 | 17.71 | 12.45 | *** | 19.10 | 20.83 | 18.50 | | 19.90 | 18.39 | 20.42 | |
| Average total land area (ha) | 1.612 | 0.995 | 1.810 | *** | 1.498 | 0.821 | 1.731 | *** | 1.385 | 0.804 | 1.586 | *** |
| - Owned share (%, c) | 99.32 | 98.97 | 99.43 | | 99.22 | 99.26 | 99.21 | | 99.32 | 99.59 | 99.23 | . |
| - Rented-in share (%, c) | 0.68 | 1.02 | 0.57 | | 0.78 | 0.74 | 0.79 | | 0.68 | 0.41 | 0.77 | . |
| - Leased share (%, c) | 30.84 | 12.80 | 36.64 | *** | 29.65 | 9.64 | 36.54 | *** | 28.17 | 9.43 | 34.66 | *** |
| - Available share (%, c) | 69.16 | 87.20 | 63.36 | *** | 70.35 | 90.36 | 63.46 | *** | 71.83 | 90.57 | 65.33 | *** |
| - Abandoned share (%, c) | 14.64 | 21.08 | 12.57 | *** | 17.41 | 25.05 | 14.79 | *** | 16.88 | 23.51 | 14.58 | *** |
| - Farmed share (%, c) | 54.52 | 66.12 | 50.79 | *** | 52.93 | 65.31 | 48.67 | *** | 54.95 | 67.06 | 50.75 | *** |
| Mechanization (own tractor) (%, a) | 2.07 | 2.24 | 2.01 | | 2.70 | 2.54 | 2.76 | | 2.37 | 2.10 | 2.47 | |
| Share of in-kind farm income (%, c) | 87.45 | 83.45 | 88.70 | *** | 88.51 | 87.06 | 89.00 | . | 85.92 | 83.78 | 86.66 | * |
| Land productivity (MDL/ha farmed) (b) | 28,413 | 32,207 | 27,193 | . | 20,216 | 17,350 | 21,203 | * | 19,539 | 17,934 | 20,096 | |

Source: Moldova Household Budget Survey. (a) Percentage of farming households presenting this characteristic out of total farming households in the group; (b) Monetary values in constant MDL at 2010 prices; (c) Average percentage among farming households in the group. Level of significance of the difference of means between groups: *** = 0.001; ** = 0.010; * = 0.050; . = 0.100.

**Table 4A. Welfare and farm characteristics along according to labour input (hiring vs. autarchic), family characteristics, location (urban vs. rural), and poverty situation in 2013.**

| | By farm status | | By labour input | | By family characteristics | | | | | | | | By location | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Farms | Other | Own | Hired | Young | Old | Large | Female | Mid-low | Poor | Children | Migrant | Rural | Periph. |
| Corresponding population (1,000) | 2,348 | 991 NA | 1,976 | 372 NA | 207 | 747 | 975 | 726 | 676 | 736 | 1,011 | 404 | 1,872 | 1,716 |
| Corresponding population (%) | 70.31 | 29.69 NA | 84.16 | 15.84 NA | 8.83 | 31.79 | 41.51 | 30.92 | 28.80 | 31.34 | 43.04 | 17.21 | 79.72 | 73.07 |
| Average household size | 2.46 | 2.31 ** | 2.53 | 2.16 *** | 3.18*** | 1.84*** | 4.57*** | 1.96*** | 2.16*** | 2.48 | 4.01*** | 2.62** | 2.52*** | 2.42** |
| Average age of household head (year) | 56.62 | 49.51 *** | 55.86 | 60.08 *** | 28.48*** | 69.50 | 47.46*** | 59.54*** | 62.78*** | 57.22. | 45.46*** | 48.61*** | 56.06*** | 57.06** |
| Female household head (%) | 38.95 | 48.53 *** | 38.26 | 42.08 . | 38.54 | 57.30*** | 22.92*** | NA | 54.77*** | 43.07** | 33.81*** | 51.80*** | 37.38** | 40.10* |
| Bad health status household head (%) | 21.38 | 14.48 *** | 19.60 | 29.48 *** | 1.99*** | 35.09*** | 11.06*** | 27.26*** | 31.36*** | 25.55*** | 10.41*** | 13.41*** | 21.08 | 21.37 |
| Education of household head is low (%) | 8.80 | 1.71 *** | 7.90 | 12.88 *** | 1.29*** | 20.19*** | 4.07*** | 15.39*** | 26.38*** | 13.22*** | 4.37*** | 3.15*** | 9.52** | 10.06*** |
| Education of household head is high (%) | 19.70 | 55.31 *** | 18.83 | 23.65 ** | 16.84 | 17.28** | 18.83 | 21.81* | 0.00*** | 9.11*** | 18.90 | 20.44 | 15.22*** | 19.11 |
| Average household income (MDL) (a) | 36,685 | 51,704 *** | 37,253 | 34,110 ** | 45,631*** | 25,630*** | 57,810*** | 29,588*** | 26,776*** | 17,203*** | 52,041*** | 47,923*** | 36,071* | 34,743*** |
| Average per capita income (equ.) (MDL) (a) | 18,922 | 28,404 *** | 18,884 | 19,094 | 21,005* | 16,103*** | 17,918** | 18,185* | 15,253*** | 9,013*** | 18,994 | 25,484*** | 18,286*** | 18,230*** |
| Farm income (% of total income) | 18.58 | 0.06 *** | 18.26 | 20.00 . | 14.21*** | 14.78*** | 21.28*** | 14.27*** | 18.03 | 25.34*** | 19.56 | 15.47*** | 22.20*** | 19.77*** |
| Earned non-farm income (%) | 41.82 | 65.43 *** | 43.22 | 35.49 *** | 69.99*** | 14.32*** | 61.35*** | 35.29*** | 25.62*** | 24.30*** | 62.17*** | 70.01*** | 40.26*** | 39.13*** |
| Household with job seeker (%) | 10.19 | 9.78 | 11.01 | 6.50 *** | 20.34*** | 3.37*** | 18.66*** | 7.58*** | 8.20*** | 14.36*** | 16.01*** | 12.43. | 10.52 | 8.93*** |
| Household with underemployment (%) | 22.29 | 11.95 *** | 24.24 | 13.50 *** | 38.16*** | 7.94*** | 39.28*** | 16.99*** | 18.94*** | 30.76*** | 34.78*** | 28.61*** | 24.27*** | 22.96 |
| Poor farm households (%) | 31.10 | 10.95 *** | 31.66 | 28.58 | 32.43 | 33.34** | 32.99 | 34.40** | 39.51*** | NA | 32.81 | 20.74*** | 33.01*** | 32.53*** |
| Average life condition (1-5) | 2.92 | 2.87 * | 2.90 | 3.03 *** | 3.06*** | 2.82*** | 3.00*** | 2.84*** | 2.80*** | 2.80*** | 2.98*** | 3.07*** | 2.95*** | 2.93 |
| Difficulty to pay for food (%) | 34.77 | 41.79 *** | 36.84 | 25.42 *** | 35.21 | 34.86 | 39.28** | 35.76 | 40.89*** | 44.60*** | 38.83** | 29.58** | 35.19 | 34.92 |
| Difficulty to pay for electricity (%) | 19.90 | 29.58 *** | 21.23 | 13.90 *** | 23.02 | 18.49 . | 24.31** | 20.10 | 22.03* | 28.51*** | 24.04*** | 16.35* | 19.01* | 20.42 |
| Owned land (ha) | 1.372 | 0.181 *** | 1.301 | 1.691 *** | 0.681*** | 1.392 | 1.484* | 1.146*** | 1.383 | 1.336 | 1.323 | 1.572** | 1.682*** | 1.570*** |
| Leased land (ha) | 0.726 | 0.112 *** | 0.784 | 0.622 ** | 0.319*** | 0.834*** | 0.609** | 0.688 | 0.841*** | 0.628*** | 0.626** | 0.809. | 0.892*** | 0.914*** |
| Rented-in land (ha) | 0.013 | 0.000 *** | 0.009 | 0.029 | 0.015 | 0.002*** | 0.345* | 0.004** | 0.007. | 0.016 | 0.022. | 0.007 | 0.016*** | 0.016** |
| Farmed land (ha) | 0.538 | 0.000 *** | 0.443 | 0.967 *** | 0.301*** | 0.387*** | 0.762*** | 0.358*** | 0.414*** | 0.583. | 0.591* | 0.624* | 0.662*** | 0.552. |
| Abandoned land (ha) | 0.121 | 0.007 *** | 0.119 | 0.131 | 0.075*** | 0.127 | 0.148. | 0.103* | 0.135 | 0.141* | 0.128 | 0.146 | 0.144*** | 0.120 |
| Average number of cows | 0.22 | 0.00 *** | 0.23 | 0.21 | 0.15* | 0.13*** | 0.41*** | 0.12*** | 0.15*** | 0.17*** | 0.33*** | 0.24 | 0.28*** | 0.25*** |
| Average number of pigs | 0.20 | 0.00 *** | 0.17 | 0.33 *** | 0.10*** | 0.10*** | 0.31*** | 0.09*** | 0.13*** | 0.17 | 0.22 | 0.20 | 0.25*** | 0.22*** |
| Average number of poultry animals | 17.80 | 0.15 *** | 16.74 | 22.59 *** | 14.78* | 15.86*** | 21.37*** | 15.33*** | 15.94*** | 15.07*** | 19.72*** | 20.21*** | 20.48*** | 19.04*** |
| Mechanization (own tractor) (%) | 2.37 | 0.00 *** | 1.57 | 6.01 *** | 1.54 | 0.94*** | 3.65* | 0.91*** | 0.95*** | 0.97*** | 3.46* | 3.35 | 2.96*** | 2.47 |
| Labour input (hours per week) | 20.90 | 0.03 *** | 20.05 | 24.74 *** | 15.75*** | 21.07 | 25.96*** | 16.09*** | 20.39 | 24.11*** | 21.28 | 20.83 | 24.14*** | 21.40* |
| Comparable farm production (MDL) (a) | 7,883 | 13 *** | 7,249 | 10,763 *** | 6,152*** | 5,470*** | 12,781*** | 5,171*** | 6,245*** | 6,966*** | 10,617*** | 8,357 | 9,379*** | 8,196*** |
| Share of animal production (MDL) (a) | 36.35 | 76.58 *** | 37.02 | 33.44 * | 30.20*** | 34.37*** | 42.09*** | 31.50*** | 35.14. | 34.45** | 38.60** | 37.62 | 37.98*** | 38.25*** |
| Share of self-consumed production (%) | 87.07 | 96.77 ** | 89.31 | 77.38 *** | 91.22*** | 90.47*** | 86.94 | 90.60*** | 89.21*** | 88.80*** | 87.74 | 86.66 | 84.88*** | 88.17*** |
| Land productivity (MDL/ha farmed) (a) | 16,672 | NA NA | 17,836 | 11,390 *** | 21,404*** | 15,385** | 21,286*** | 16,002 | 15,137** | 15,115* | 20,682*** | 14,859* | 14,109*** | 16,569 |
| Labour productivity (MDL/yearly-hour) (a) | 22.95 | 2.58 *** | 6.47 | 76.08 *** | 17.02 | 10.45*** | 16.45* | 17.88. | 11.13*** | 9.04*** | 21.06 | 28.23 | 24.84** | 22.44 |
| Total farm expenditures (MDL) (a) | 2,903 | 13 *** | 2,436 | 5,026 *** | 1,986*** | 2,111*** | 4,228*** | 2,029*** | 2,215*** | 2,698* | 3,495*** | 3,481*** | 3,409*** | 2,938 |

Source: Moldova Household Budget Survey. (a) Monetary values are all expressed in constant MDL at 2010 prices. The level of confidence for family features and location refers to the difference of means between the group under consideration and the residual one. Own: uses only family labour. Hired: hires agricultural labour. Young: household head aged less than 35. Old: household head aged less that 57 (female) or less than 62 (male). Large: household with four or more members (90th percentile). Female: female household head. Mid-low: household head did not attain secondary education. Poor: income per equivalent member under the poverty threshold. Child: household with at least one child aged 14 or less. Migrant: household with migrants. Rural: household based in rural areas. Periph.: household based at more than 60 km road distance from Chișinău. (a) Monetary values are all expressed in current 2013 MDL.

**Table 5A. Descriptive statistics of household welfare and farm characteristics (2007-2013).**

| Year | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | $\beta_1$ (a) | P>|t| | R² | (b) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. of active farms in the sample | 4,561 | 4,726 | 4,704 | 4,269 | 4,252 | 4,418 | 4,267 | 4,059 | NA | | | NA |
| Active farm households in the sample (%) | 71.66 | 69.51 | 69.32 | 69.98 | 69.67 | 69.03 | 68.47 | 68.94 | NA | | | NA |
| Farming population (1,000) | 2,472 | 2,376 | 2,359 | 2,412 | 2,390 | 2,385 | 2,368 | 2,348 | NA | | | NA |
| Subsistence farms (%) | NA | 73.12 | 72.99 | 77.81 | 78.25 | 76.88 | 76.58 | 74.16 | 0.306 | * | 0.000 | *** |
| Small farms (%) | 52.75 | 50.05 | 51.69 | 53.91 | 54.78 | 55.57 | 55.33 | 55.22 | 0.662 | *** | 0.001 | *** |
| Farms in the central territory (%) | 26.65 | 24.33 | 23.37 | 25.95 | 25.60 | 28.46 | 27.70 | 25.74 | 0.300 | * | 0.000 | *** |
| Farms in urban areas (%) | 21.53 | 19.86 | 20.98 | 21.68 | 21.14 | 20.91 | 20.87 | 22.16 | 0.106 | | 0.000 | |
| Poor farm households (%) | 44.04 | 42.30 | 41.79 | 43.65 | 37.80 | 33.77 | 33.18 | 31.10 | -1.985 | *** | 0.009 | *** |
| Average household size | 2.86 | 2.77 | 2.71 | 2.75 | 2.67 | 2.64 | 2.59 | 2.46 | -0.018 | *** | Poisson | *** |
| Average age of household head | 54.44 | 54.80 | 55.40 | 55.45 | 55.80 | 55.78 | 56.50 | 56.62 | 0.005 | *** | Poisson | *** |
| Female household head (%) | 34.22 | 36.68 | 37.66 | 36.72 | 36.69 | 37.23 | 38.39 | 38.95 | 0.481 | *** | 0.001 | ** |
| Bad health status household head (%) | 25.13 | 24.13 | 23.98 | 22.70 | 22.55 | 23.22 | 24.40 | 21.38 | -0.327 | ** | 0.000 | ** |
| Education of household head is low (%) | 16.14 | 14.44 | 14.11 | 13.23 | 12.09 | 11.75 | 10.85 | 8.80 | -0.927 | *** | 0.004 | *** |
| Education of household head is high (%) | 20.60 | 20.58 | 20.46 | 20.40 | 20.04 | 20.64 | 19.09 | 19.70 | -0.162 | | 0.000 | |
| Max education in household is low (%) | 10.81 | 10.44 | 10.20 | 9.16 | 8.41 | 8.08 | 7.47 | 6.23 | -0.646 | *** | 0.003 | *** |
| Max education in household is high (%) | 31.78 | 30.76 | 29.74 | 29.89 | 29.54 | 32.01 | 29.96 | 30.37 | -0.085 | | 0.000 | |
| Household with job seeker (%) | 12.46 | 11.67 | 11.45 | 14.76 | 13.30 | 13.35 | 10.66 | 10.19 | -0.211 | ** | 0.008 | *** |
| Household with underemployment (%) | 35.94 | 27.12 | 25.08 | 29.82 | 29.12 | 23.49 | 21.72 | 22.29 | -1.518 | *** | 0.006 | *** |
| Average household income (MDL) (c) | 34,733 | 36,161 | 36,301 | 35,528 | 35,666 | 36,524 | 36,025 | 36,685 | 164.89 | * | 0.000 | |
| Average per capita income (equ.) (MDL) (c) | 16,172 | 17,073 | 17,747 | 16,732 | 17,450 | 17,941 | 18,095 | 18,922 | 307.60 | *** | 0.003 | *** |
| Farm income (% of total income) | NA | 29.35 | 21.44 | 18.45 | 19.43 | 19.93 | 19.22 | 18.58 | -1.234 | *** | 0.012 | *** |
| Earned non-farm income (%) | NA | 40.70 | 48.22 | 45.65 | 43.89 | 43.61 | 41.89 | 41.82 | -0.422 | * | 0.000 | *** |
| Difficulty to pay for food (%) | 35.64 | 37.34 | 42.96 | 41.36 | 40.51 | 40.19 | 40.23 | 34.77 | 0.040 | | 0.000 | *** |
| Difficulty to pay for electricity (%) | 15.30 | 13.73 | 17.49 | 17.90 | 19.10 | 21.39 | 20.49 | 19.90 | -0.927 | *** | 0.003 | *** |
| Average total land area (ha) | 1.566 | 1.612 | 1.589 | 1.534 | 1.498 | 1.459 | 1.420 | 1.385 | -0.032 | *** | Poisson | *** |
| - Owned share (%, c) | 99.37 | 99.32 | 99.39 | 99.16 | 99.22 | 99.19 | 99.30 | 99.32 | -0.011 | | 0.000 | |
| - Rented-in share (%, c) | 0.63 | 0.68 | 0.61 | 0.84 | 0.78 | 0.81 | 0.70 | 0.68 | 0.011 | | 0.000 | |
| - Leased share (%, c) | 30.80 | 30.84 | 29.18 | 30.31 | 29.65 | 28.53 | 28.11 | 28.17 | 0.413 | *** | 0.001 | ** |
| - Available share (%, c) | 69.20 | 69.16 | 70.82 | 69.69 | 70.35 | 71.47 | 71.89 | 71.83 | 0.413 | *** | 0.001 | ** |
| - Abandoned share (%, c) | 14.18 | 14.64 | 15.45 | 16.61 | 17.41 | 17.63 | 17.24 | 16.88 | 0.459 | *** | 0.002 | *** |
| - Farmed share (%, c) | 55.01 | 54.52 | 55.37 | 53.08 | 52.93 | 53.84 | 54.65 | 54.95 | -0.046 | | 0.000 | ** |
| Mechanization (own tractor) (%) | 2.51 | 2.07 | 2.64 | 2.80 | 2.70 | 2.39 | 2.38 | 2.37 | -0.004 | | 0.000 | |
| Share of in-kind farm income (%) | NA | 87.45 | 85.34 | 88.12 | 88.51 | 88.15 | 88.47 | 85.92 | 0.047 | | 0.000 | *** |
| Land productivity (MDL/ha farmed) (c) | NA | 28,413 | 20,140 | 18,244 | 20,216 | 22,407 | 21,632 | 19,539 | -678.0 | *** | 0.001 | *** |

Source: Moldova Household Budget Survey. (a) Slope of the regression line $X = \beta_1 t + \beta_0$; (b) Level of significance of the difference of means among all years. (c) Monetary values are in constant MDL at 2010 prices. Level of significance of the difference of means between groups: *** = 0.001; ** = 0.010; * = 0.050; . = 0.100.

**Table 6A. Multinomial logistic regression for variation of total farmland from year *t-1* to year *t*.**

Observations: 6,855
Wald Chi2(30): 4,653.62
Log likelihood: -3,989.07; Prob. > Chi2 = 0

| | Variation of total farmland | Coeff. | St. err. | z | P>\|z\| | 95% conf. int. | | Δ odd r. |
|---|---|---|---|---|---|---|---|---|
| **Shrinkage** | Equivalent family size | 0.014 | 0.056 | 0.25 | 0.803 | -0.096 | 0.124 | |
| | Farm income >50% (dummy) | **-0.371** | 0.147 | -2.52 | 0.012 | -0.659 | -0.082 | **-30.97%** |
| | Farm income <0 (t-1) (dummy) | **0.589** | 0.138 | 4.28 | 0.000 | 0.319 | 0.858 | **80.13%** |
| | Land farmed per member | 0.000 | 0.000 | -1.14 | 0.255 | 0.000 | 0.000 | |
| | Farm income per capita (t-1) | **0.000** | 0.000 | 2.91 | 0.004 | 0.000 | 0.000 | |
| | Land farmed | 0.000 | 0.000 | 0.76 | 0.449 | 0.000 | 0.000 | |
| | Land leased | 0.000 | 0.000 | 0.24 | 0.808 | 0.000 | 0.000 | |
| | Land abandoned | 0.000 | 0.000 | 0.15 | 0.884 | 0.000 | 0.000 | |
| | Tractor ownership (dummy) | **-0.612** | 0.127 | -4.80 | 0.000 | -0.861 | -0.362 | **-45.76%** |
| | Underemployment (dummy) | **-0.350** | 0.097 | -3.60 | 0.000 | -0.540 | -0.159 | **-29.50%** |
| | Low level of education of head (dummy) | **0.288** | 0.149 | 1.94 | 0.053 | -0.004 | 0.579 | **33.37%** |
| | Distance from Chișinău (km) | **-0.005** | 0.001 | -4.96 | 0.000 | -0.007 | -0.003 | **-0.53%** |
| | Distance from town (km) | **0.008** | 0.003 | 2.23 | 0.025 | 0.001 | 0.014 | **0.78%** |
| | Central region (dummy) | **0.329** | 0.108 | 3.06 | 0.002 | 0.118 | 0.540 | **38.97%** |
| | Distance from Chișinău <60 km (dummy) | **-0.785** | 0.134 | -5.86 | 0.000 | -1.048 | -0.523 | **-54.41%** |
| **No variation** (base outcome) | | | | | | | | |
| **Growth** | Equivalent family size | **0.255** | 0.049 | 5.23 | 0.000 | 0.160 | 0.351 | **29.09%** |
| | Farm income >50% (dummy) | **-0.245** | 0.145 | -1.69 | 0.091 | -0.529 | 0.039 | **-21.74%** |
| | Farm income <0 (t-1) (dummy) | -0.137 | 0.161 | -0.85 | 0.396 | -0.453 | 0.179 | |
| | Land farmed per member | **0.000** | 0.000 | 3.85 | 0.000 | 0.000 | 0.000 | **0.01%** |
| | Farm income per member (t-1) | 0.000 | 0.000 | -1.06 | 0.289 | 0.000 | 0.000 | |
| | Land farmed | **0.000** | 0.000 | -2.01 | 0.044 | 0.000 | 0.000 | |
| | Land leased | **0.000** | 0.000 | -2.04 | 0.042 | 0.000 | 0.000 | |
| | Land abandoned | **0.000** | 0.000 | 6.92 | 0.000 | 0.000 | 0.000 | **0.01%** |
| | Tractor ownership (dummy) | **-0.802** | 0.121 | -6.65 | 0.000 | -1.038 | -0.565 | **-55.14%** |
| | Underemployment (dummy) | **-0.273** | 0.097 | -2.80 | 0.005 | -0.464 | -0.082 | **-23.88%** |
| | Low level of education of head (dummy) | -0.197 | 0.189 | -1.04 | 0.298 | -0.568 | 0.174 | |
| | Distance from Chișinău (km) | **-0.005** | 0.001 | -4.60 | 0.000 | -0.007 | -0.003 | **-0.50%** |
| | Distance from town (km) | **-0.009** | 0.004 | -2.37 | 0.018 | -0.016 | -0.002 | **-0.89%** |
| | Central region (dummy) | **0.251** | 0.110 | 2.29 | 0.022 | 0.036 | 0.467 | **28.58%** |
| | Distance from Chișinău <60 km (dummy) | **-0.782** | 0.135 | -5.78 | 0.000 | -1.047 | -0.517 | **-54.27%** |

Source: Author's elaboration on Moldova Household Budget Survey data.

**Table 7A. Multinomial logistic regression for variation of farmed land from year *t-1* to year *t*.**

Observations: 6,855
Wald Chi2(32): 3,819.09
Log likelihood: -5,069.88; Prob. > Chi2 = 0

| | Variation of farmed land | Coeff. | St. err. | z | P>\|z\| | 95% conf. int. | | Δ odd r. |
|---|---|---|---|---|---|---|---|---|
| **Shrinkage** | Equivalent family size | -0.018 | 0.054 | -0.34 | 0.734 | -0.123 | 0.087 | |
| | Underemployment (dummy) | **-0.200** | 0.092 | -2.18 | 0.029 | -0.379 | -0.020 | **-18.10%** |
| | Non-farm income (t-1) | 0.000 | 0.000 | 0.39 | 0.697 | 0.000 | 0.000 | |
| | Farm income <0 (t-1) (dummy) | **0.364** | 0.123 | 2.97 | 0.003 | 0.124 | 0.605 | **43.97%** |
| | Farm income per member (t-1) | **0.000** | 0.000 | 2.14 | 0.033 | 0.000 | 0.000 | |
| | Land farmed per equivalent member | 0.000 | 0.000 | -1.56 | 0.119 | 0.000 | 0.000 | |
| | Land farmed | 0.000 | 0.000 | 1.50 | 0.134 | 0.000 | 0.000 | |
| | Land leased | **0.000** | 0.000 | -2.11 | 0.034 | 0.000 | 0.000 | |
| | Land abandoned | **0.000** | 0.000 | 11.18 | 0.000 | 0.000 | 0.000 | **0.01%** |
| | Tractor ownership (dummy) | **-0.338** | 0.199 | -1.70 | 0.088 | -0.727 | 0.051 | **-28.70%** |
| | Distance from town (km) | -0.002 | 0.003 | -0.73 | 0.466 | -0.008 | 0.004 | |
| | Distance from Chișinău <60 km (dummy) | **-0.570** | 0.105 | -5.45 | 0.000 | -0.776 | -0.365 | **-43.47%** |
| | Northern region (dummy) | **-1.100** | 0.463 | -2.37 | 0.018 | -2.009 | -0.192 | **-66.72%** |
| | Central region (dummy) | -0.316 | 0.466 | -0.68 | 0.498 | -1.229 | 0.597 | |
| | Southern region (dummy) | -0.495 | 0.466 | -1.06 | 0.288 | -1.409 | 0.418 | |
| | Chișinău region (dummy) | -0.580 | 0.533 | -1.09 | 0.276 | -1.624 | 0.464 | |
| **No variation** (base outcome) | | | | | | | | |

| | | Coeff. | St. err. | z | P>|z| | 95% conf. int. | | Δ odd r. |
|---|---|---|---|---|---|---|---|---|
| **Growth** | Equivalent family size | **0.321** | 0.048 | 6.65 | 0.000 | 0.226 | 0.416 | **37.86%** |
| | Underemployment (dummy) | -0.030 | 0.096 | -0.32 | 0.752 | -0.219 | 0.158 | |
| | Non-farm income (t-1) | **0.000** | 0.000 | -1.80 | 0.072 | 0.000 | 0.000 | |
| | Farm income <0 (t-1) (dummy) | -0.115 | 0.137 | -0.84 | 0.403 | -0.384 | 0.154 | |
| | Farm income per member (t-1) | **0.000** | 0.000 | 4.13 | 0.000 | 0.000 | 0.000 | **0.01%** |
| | Land farmed per equivalent member | **0.000** | 0.000 | -2.42 | 0.016 | 0.000 | 0.000 | |
| | Land farmed | 0.000 | 0.000 | -0.98 | 0.325 | 0.000 | 0.000 | |
| | Land leased | **0.000** | 0.000 | -3.69 | 0.000 | 0.000 | 0.000 | |
| | Land abandoned | **0.000** | 0.000 | 3.88 | 0.000 | 0.000 | 0.000 | |
| | Tractor ownership (dummy) | **-0.363** | 0.187 | -1.94 | 0.052 | -0.729 | 0.004 | **-30.41%** |
| | Distance from town (km) | **-0.006** | 0.003 | -1.91 | 0.056 | -0.013 | 0.000 | **-0.63%** |
| | Distance from Chișinău <60 km (dummy) | **-0.324** | 0.106 | -3.05 | 0.002 | -0.532 | -0.115 | **-27.65%** |
| | Northern region (dummy) | **-1.739** | 0.444 | -3.91 | 0.000 | -2.609 | -0.868 | **-82.43%** |
| | Central region (dummy) | **-1.302** | 0.449 | -2.90 | 0.004 | -2.182 | -0.422 | **-72.80%** |
| | Southern region (dummy) | **-1.308** | 0.448 | -2.92 | 0.004 | -2.186 | -0.429 | **-72.95%** |
| | Chișinău region (dummy) | **-1.451** | 0.515 | -2.82 | 0.005 | -2.461 | -0.441 | **-76.57%** |

Source: Author's elaboration of Moldova Household Budget Survey data.

**Table 8A. Multinomial logistic regression for variation of owned land from year *t-1* to year *t*.**

Observations: 8,561

Wald Chi2(30): 5,925.94

Log likelihood: -4,779.4957; Prob. > Chi2 = 0

| Variation of owned land | | Coeff. | St. err. | z | P>|z| | 95% conf. int. | | Δ odd r. |
|---|---|---|---|---|---|---|---|---|
| **Land sale** | Farm in urban area | **0.558** | 0.112 | 4.98 | 0.000 | 0.338 | 0.778 | **74.75%** |
| | Distance from Chișinău <60 km (dummy) | **-0.538** | 0.104 | -5.20 | 0.000 | -0.741 | -0.335 | **-41.63%** |
| | Equivalent family size | 0.087 | 0.079 | 1.11 | 0.269 | -0.067 | 0.241 | |
| | Age of the household head | **-0.006** | 0.003 | -2.12 | 0.034 | -0.012 | 0.000 | **-0.60%** |
| | Land farmed per equivalent member | **0.000** | 0.000 | -2.77 | 0.006 | 0.000 | 0.000 | **-0.01%** |
| | Land farmed | 0.000 | 0.000 | 0.69 | 0.491 | 0.000 | 0.000 | |
| | Land leased | **0.000** | 0.000 | -7.86 | 0.000 | 0.000 | 0.000 | |
| | Land abandoned | 0.000 | 0.000 | -1.63 | 0.103 | 0.000 | 0.000 | |
| | Farm income | **0.000** | 0.000 | -4.36 | 0.000 | -0.001 | 0.000 | **-0.04%** |
| | No. of working age members | **-0.106** | 0.057 | -1.88 | 0.060 | -0.217 | 0.005 | **-10.08%** |
| | Tractor ownership (dummy) | **-1.115** | 0.133 | -8.39 | 0.000 | -1.375 | -0.854 | **-67.19%** |
| | Non-farm income | **0.000** | 0.000 | -3.21 | 0.001 | 0.000 | 0.000 | **-0.01%** |
| | Farm income <0 (t-1) (dummy) | 0.211 | 0.131 | 1.61 | 0.108 | -0.046 | 0.469 | |
| | Non-farm income (t-1) | 0.000 | 0.000 | -0.39 | 0.700 | 0.000 | 0.000 | |
| | Farm income (t-1) | **0.000** | 0.000 | 4.09 | 0.000 | 0.000 | 0.000 | **0.03%** |
| **No variation** (base outcome) | | | | | | | | |
| **Land purchase** | Farm in urban area | 0.021 | 0.106 | 0.20 | 0.843 | -0.187 | 0.229 | |
| | Distance from Chișinău <60 km (dummy) | **-0.332** | 0.104 | -3.18 | 0.001 | -0.536 | -0.127 | **-28.25%** |
| | Equivalent family size | **0.409** | 0.066 | 6.18 | 0.000 | 0.279 | 0.538 | **50.46%** |
| | Age of the household head | **-0.012** | 0.003 | -4.28 | 0.000 | -0.017 | -0.006 | **-1.18%** |
| | Land farmed per equivalent member | **0.000** | 0.000 | 2.23 | 0.025 | 0.000 | 0.000 | **0.00%** |
| | Land farmed | 0.000 | 0.000 | -1.61 | 0.107 | 0.000 | 0.000 | |
| | Land leased | **0.000** | 0.000 | 4.14 | 0.000 | 0.000 | 0.000 | |
| | Land abandoned | **0.000** | 0.000 | 2.71 | 0.007 | 0.000 | 0.000 | |
| | Farm income | 0.000 | 0.000 | -0.99 | 0.322 | 0.000 | 0.000 | |
| | No. of working age members | **-0.089** | 0.051 | -1.75 | 0.080 | -0.189 | 0.011 | **-8.53%** |
| | Tractor ownership (dummy) | **-1.105** | 0.121 | -9.12 | 0.000 | -1.342 | -0.867 | **-66.87%** |
| | Non-farm income | **0.000** | 0.000 | 2.07 | 0.038 | 0.000 | 0.000 | |
| | Farm income <0 (t-1) (dummy) | **-0.276** | 0.145 | -1.90 | 0.058 | -0.560 | 0.009 | **-24.10%** |
| | Non-farm income (t-1) | **0.000** | 0.000 | -3.10 | 0.002 | 0.000 | 0.000 | **-0.01%** |
| | Farm income (t-1) | **0.000** | 0.000 | -4.41 | 0.000 | -0.001 | 0.000 | **-0.04%** |

Source: Author's elaboration on Moldova Household Budget Survey data.

**Table 9A. Production function for vegetable production (logarithm) (2013).**

| | | | | | | |
|---|---|---|---|---|---|---|
| Number of strata: 1 | | | Number of PSUs: 5,082 | | | |
| Number of observations: 5,082 | | | Population size: 1,383,011.8 | | | |
| Subpopulation number of observations: 3,909 | | | Subpopulation size: 903,279.81 | | | |
| Design degrees of freedom: 5,081 | | | $F(14, 5068) = 179.55$ | | Prob. $> F = 0.000$ | |
| R-squared = 0.4869 | | | | | | |

| Comparable animal production (log) | Coeff. | St. err. | t | P>\|t\| | 95% conf. int. | |
|---|---|---|---|---|---|---|
| Residence in urban area (dummy) | **-0.351** | 0.058 | -6.07 | 0.000 | -0.464 | -0.238 |
| Central region (dummy) | **-0.067** | 0.030 | -2.21 | 0.027 | -0.126 | -0.007 |
| Southern region (dummy) | **-0.301** | 0.040 | -7.61 | 0.000 | -0.378 | -0.223 |
| Chișinău region (dummy) | **-0.318** | 0.115 | -2.77 | 0.006 | -0.542 | -0.093 |
| Age of household head | **0.026** | 0.006 | 4.19 | 0.000 | 0.014 | 0.038 |
| Age of household head (squared) | **0.000** | 0.000 | -4.63 | 0.000 | 0.000 | 0.000 |
| Household size | **0.316** | 0.041 | 7.69 | 0.000 | 0.235 | 0.396 |
| Household size (squared) | **-0.024** | 0.006 | -3.81 | 0.000 | -0.037 | -0.012 |
| Constant term (total factor productivity) | **3.989** | 0.221 | 18.01 | 0.000 | 3.554 | 4.423 |
| Fertilizer input (log) | **0.047** | 0.009 | 5.34 | 0.000 | 0.030 | 0.065 |
| Pesticide input (log) | **0.052** | 0.007 | 7.58 | 0.000 | 0.038 | 0.065 |
| Seed and seedlings input (log) | **0.108** | 0.023 | 4.62 | 0.000 | 0.062 | 0.154 |
| Mechanization input (log) | 0.007 | 0.007 | 1.01 | 0.312 | -0.007 | 0.022 |
| Land farmed ($m^2$) (log) | **0.259** | 0.025 | 10.30 | 0.000 | 0.210 | 0.308 |
| Labour used (log) | **0.029** | 0.005 | 5.41 | 0.000 | 0.019 | 0.040 |

Source: Author's elaboration on Moldova Household Budget Survey data.


**Table 10A. Production function for animal production (logarithm) (2013).**

| | | | | | | |
|---|---|---|---|---|---|---|
| Number of strata: 1 | | | Number of PSUs: 5,082 | | | |
| Number of observations: 5,082 | | | Population size: 1,383,011.8 | | | |
| Subpopulation number of observations: 3,155 | | | Subpopulation size: 726,015.56 | | | |
| Design degrees of freedom: 5,081 | | | $F(20, 5062) = 175.23$ | | Prob. $> F = 0.000$ | |
| R-squared = 0.5390 | | | | | | |

| Comparable animal production (log) | Coeff. | St. err. | t | P>\|t\| | 95% conf. int. | |
|---|---|---|---|---|---|---|
| Residence in urban area (dummy) | **-0.129** | 0.062 | -2.09 | 0.036 | -0.250 | -0.008 |
| Central region (dummy) | -0.041 | 0.034 | -1.24 | 0.216 | -0.107 | 0.024 |
| Southern region (dummy) | **0.136** | 0.038 | 3.56 | 0.000 | 0.061 | 0.211 |
| Chișinău region (dummy) | -0.233 | 0.163 | -1.43 | 0.153 | -0.553 | 0.087 |
| Age of household head | **0.019** | 0.007 | 2.84 | 0.005 | 0.006 | 0.032 |
| Age of household head (squared) | **0.000** | 0.000 | -3.31 | 0.001 | 0.000 | 0.000 |
| Household size | **0.399** | 0.044 | 9.13 | 0.000 | 0.313 | 0.484 |
| Household size (squared) | **-0.034** | 0.006 | -5.28 | 0.000 | -0.046 | -0.021 |
| Veterinary control (dummy) | **0.129** | 0.033 | 3.92 | 0.000 | 0.065 | 0.193 |
| Area of the small share ($m^2$) | **0.100** | 0.033 | 3.05 | 0.002 | 0.036 | 0.165 |
| Cattle barn (dummy) | -0.005 | 0.054 | -0.08 | 0.932 | -0.110 | 0.101 |
| Stables (dummy) | **0.240** | 0.064 | 3.74 | 0.000 | 0.114 | 0.366 |
| Constant term | **4.937** | 0.307 | 16.08 | 0.000 | 4.335 | 5.539 |
| Animal feed (log) | 0.003 | 0.015 | 0.20 | 0.844 | -0.026 | 0.032 |
| Number of cows (log) | **0.768** | 0.082 | 9.35 | 0.000 | 0.607 | 0.929 |
| Number of sheep (log) | **0.251** | 0.031 | 8.18 | 0.000 | 0.191 | 0.311 |
| Number of goats (log) | **0.308** | 0.052 | 5.89 | 0.000 | 0.205 | 0.410 |
| Number of pigs (log) | **0.346** | 0.042 | 8.26 | 0.000 | 0.264 | 0.428 |
| Number of poultry animals (log) | **0.178** | 0.022 | 8.24 | 0.000 | 0.136 | 0.221 |
| Number of other animals (log) | **0.159** | 0.022 | 7.23 | 0.000 | 0.116 | 0.202 |
| Used labour (hours) (log) | **0.016** | 0.006 | 2.87 | 0.004 | 0.005 | 0.027 |

Source: Author's elaboration on Moldova Household Budget Survey data.

**Table 11A. Farm production decomposed into different product categories (2013).**

| Income and products | All farms | Periph. | Centre | Subsist. | Semi-com. | Small | Medium | Large | Hiring | Autarchic | Rural | Urban |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Farm production (MDL) (a) | 8,078.35 | 8,303.87 | 7,530.94 | 5,686.99 | 16,283.97 | 4,764.27 | 10,591.03 | 22,048.07 | 10,704.42 | 7,511.25 | 9,275.85 | 3,261.70 |
| Fruits (incl. processed) (b) | 15.90 | 14.65 | 19.92 | 17.58 | 10.53 | 18.77 | 12.82 | 12.25 | 13.14 | 16.62 | 14.28 | 22.99 |
| Wine and grapes | 8.62 | 6.84 | 14.12 | 7.30 | 13.25 | 6.10 | 11.32 | 13.61 | 14.67 | 7.27 | 9.14 | 6.64 |
| Walnuts | 3.51 | 2.80 | 5.69 | 2.95 | 5.48 | 3.69 | 3.47 | 2.31 | 4.18 | 3.37 | 3.62 | 3.13 |
| Vegetables (incl. processed) | 20.00 | 19.94 | **20.57** | 22.20 | 12.99 | **24.06** | 16.06 | 11.81 | 17.78 | 20.63 | 18.27 | **27.67** |
| Beans | 2.74 | 2.76 | 2.74 | 3.00 | 1.93 | 3.09 | 2.41 | 2.16 | 2.48 | 2.82 | 2.73 | 2.86 |
| Potatoes | 3.81 | 4.11 | 2.98 | 4.00 | 3.24 | 4.04 | 3.66 | 3.10 | 4.76 | 3.61 | 3.85 | 3.73 |
| Cereals (incl. flour) | 4.82 | 5.83 | 1.65 | 4.45 | 5.92 | 3.92 | 5.45 | 8.23 | 4.93 | 4.75 | 5.62 | 1.33 |
| Industrial plants (incl. oil) | 3.06 | 3.68 | 1.11 | 2.86 | 3.62 | 2.41 | 3.47 | 5.91 | 3.42 | 2.95 | 3.46 | 1.28 |
| Milk and dairy products | 6.57 | 7.09 | 5.05 | 3.91 | **15.56** | 4.32 | 8.93 | 10.93 | 5.67 | 6.79 | 7.55 | 2.52 |
| Eggs | 6.34 | 6.32 | 5.97 | 7.12 | 3.23 | 7.33 | 5.25 | 2.94 | 5.61 | 6.38 | 5.57 | 8.97 |
| Meat (incl. processed) | **21.96** | **23.02** | 18.38 | **24.03** | 14.53 | 20.92 | **23.40** | 19.49 | **20.03** | 22.28 | **22.69** | 18.40 |
| Living animals | 2.34 | 2.60 | 1.60 | 0.43 | 8.84 | 1.22 | 3.27 | 6.51 | 3.01 | 2.20 | 2.86 | 0.23 |
| Honey | 0.22 | 0.24 | 0.17 | 0.08 | 0.71 | 0.13 | 0.36 | 0.12 | 0.16 | 0.24 | 0.22 | 0.26 |
| Other products | 0.10 | 0.12 | 0.05 | 0.08 | 0.18 | 0.01 | 0.15 | 0.64 | 0.17 | 0.09 | 0.12 | 0.01 |
| **Income and products** | **All farms** | **Young** | **Old** | **Large** | **Female** | **Mid-low** | **Children** | **Migrants** | **(c)** | **(d)** | **Non-poor** | **Poor** |
| Farm production (MDL) (a) | 8,078.35 | 6,539.43 | 5,616.43 | 12,974.63 | 5,372.91 | 6,312.87 | 10,851.86 | 8,476.26 | 29,390.18 | 3,814.59 | 8,642.30 | 6,966.35 |
| Fruits (incl. processed) (b) | 15.90 | 22.11 | 15.23 | 16.22 | 17.88 | 13.84 | 17.86 | 18.90 | 12.60 | 20.15 | 16.03 | 15.83 |
| Wine and grapes | 8.62 | 5.37 | 8.33 | 7.02 | 7.73 | 8.18 | 6.80 | 10.16 | **18.19** | 5.87 | 9.14 | 7.63 |
| Walnuts | 3.51 | 3.48 | 3.26 | 3.26 | 3.59 | 3.60 | 3.70 | 2.57 | 2.47 | 2.94 | 3.26 | 4.10 |
| Vegetables (incl. processed) | 20.00 | **24.91** | 21.82 | 18.28 | **23.36** | 20.26 | 19.58 | 17.54 | 9.34 | **25.57** | 19.84 | 20.65 |
| Beans | 2.74 | 3.48 | 2.95 | 2.62 | 2.90 | 3.52 | 2.93 | 2.28 | 1.98 | 3.25 | 2.41 | 3.52 |
| Potatoes | 3.81 | 4.46 | 4.63 | 2.73 | 4.62 | 5.22 | 3.07 | 2.93 | 3.01 | 4.17 | 3.58 | 4.37 |
| Cereals (incl. flour) | 4.82 | 3.32 | 5.09 | 4.40 | 4.62 | 5.76 | 4.14 | 3.69 | 7.85 | 3.41 | 4.64 | 5.09 |
| Industrial plants (incl. oil) | 3.06 | 1.71 | 3.23 | 2.71 | 2.69 | 3.36 | 2.54 | 3.12 | 5.97 | 2.28 | 3.00 | 3.12 |
| Milk and dairy products | 6.57 | 4.94 | 4.78 | 10.08 | 3.65 | 5.48 | 8.72 | 6.90 | 12.91 | 2.29 | 7.13 | 5.39 |
| Eggs | 6.34 | 4.55 | 7.32 | 5.47 | 6.89 | 6.85 | 5.08 | 5.36 | 2.08 | 7.89 | 6.03 | 6.68 |
| Meat (incl. processed) | **21.96** | 20.67 | 21.52 | **24.15** | 20.82 | **21.75** | **23.15** | **23.72** | 13.69 | 21.98 | **21.97** | **21.61** |
| Living animals | 2.34 | 0.74 | 1.61 | 2.89 | 1.19 | 2.06 | 2.23 | 2.38 | 9.50 | 0.14 | 2.62 | 1.78 |
| Honey | 0.22 | 0.27 | 0.20 | 0.11 | 0.01 | 0.08 | 0.16 | 0.37 | 0.22 | 0.06 | 0.29 | 0.07 |
| Other products | 0.10 | 0.00 | 0.04 | 0.06 | 0.05 | 0.04 | 0.03 | 0.08 | 0.17 | 0.00 | 0.08 | 0.15 |

Source: Moldova Household Budget Survey. (a) Average value of total farm production at local prices (not harmonized all over the country); all prices are in current 2013 MDL; (b) For each category: average share of total farm output among farms of the group considered (%); (c) Large semi-commercial farms; (d) Small subsistence farms.

**Table 12A. Farm expenditures decomposed into different categories (2013).**

| Type of expenditure | All farms | Periph. | Centre | Subsist. | Semi-com. | Small | Medium | Large | Hiring | Autarchic | Rural | Urban |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total expenditures (MDL) (a) | 3,017.64 | 3,025.28 | 2,994.74 | 2,582.37 | 4,482.51 | 1,473.07 | 3,993.93 | 10,706.51 | 5,051.72 | 2,547.59 | 3,433.10 | 1,288.77 |
| Expenditures/production (b) | 56.03 | 53.26 | 64.33 | 63.81 | 29.78 | 54.78 | 55.92 | 68.88 | 71.91 | 52.36 | 52.50 | 70.70 |
| Seeds and seedlings (c) | 20.13 | 19.29 | **22.59** | 20.59 | 18.73 | **26.58** | 12.40 | 11.23 | 10.98 | **22.17** | 15.72 | **35.91** |
| Own seeds | 8.83 | 8.99 | 8.39 | 8.97 | 8.46 | 10.94 | 6.47 | 4.77 | 5.22 | 9.64 | 8.27 | 10.86 |
| Fertilizers | 0.75 | 0.54 | 1.35 | 0.60 | 1.18 | 0.46 | 1.01 | 1.77 | 1.52 | 0.58 | 0.91 | 0.19 |
| Pesticides | 1.75 | 1.62 | 2.13 | 1.29 | 3.07 | 1.14 | 2.11 | 5.33 | 2.64 | 1.55 | 1.86 | 1.37 |
| Mechanization services | **21.11** | **22.36** | 17.49 | **20.87** | **21.83** | 12.09 | **31.34** | **38.11** | **22.22** | 20.87 | **25.84** | 4.22 |
| Animals | 11.04 | 11.48 | 9.77 | 12.27 | 7.52 | 10.58 | 12.39 | 5.67 | 10.83 | 11.09 | 12.16 | 7.04 |
| Animal feed | 13.73 | 12.56 | 17.12 | 14.98 | 10.17 | 18.41 | 8.66 | 3.23 | 10.20 | 14.51 | 10.59 | 24.94 |
| Own feed | 8.84 | 9.97 | 5.56 | 7.82 | 11.79 | 8.21 | 10.01 | 6.57 | 7.01 | 9.25 | 10.81 | 1.80 |
| Transport | 3.62 | 3.77 | 3.17 | 3.65 | 3.53 | 2.20 | 5.58 | 3.65 | 4.08 | 3.52 | 4.37 | 0.94 |
| Salaries (labour) | 3.55 | 3.71 | 3.09 | 3.55 | 3.55 | 2.73 | 4.39 | 5.79 | 19.56 | 0.00 | 3.96 | 2.09 |
| Taxes and contributions | 4.18 | 3.34 | 6.60 | 3.76 | 5.38 | 5.24 | 2.71 | 4.18 | 2.08 | 4.64 | 2.72 | 9.38 |
| Land rent | 0.07 | 0.09 | 0.00 | 0.05 | 0.13 | 0.00 | 0.11 | 0.46 | 0.10 | 0.06 | 0.08 | 0.02 |
| Other expenditures | 2.39 | 2.28 | 0.12 | 1.61 | 4.65 | 1.42 | 2.83 | 9.26 | 3.56 | 2.13 | 2.71 | 1.26 |
| **Type of expenditure** | **All farms** | **Young** | **Old** | **Large** | **Female** | **Mid-low** | **Children** | **Migrants** | **(c)** | **(d)** | **Non-poor** | **Poor** |
| Total expenditures (MDL) (a) | 3,017.64 | 2,096.06 | 2,187.18 | 4,353.22 | 2,117.71 | 2,274.98 | 3,618.70 | 3,598.46 | 10,527.98 | 1,374.98 | 3,139.99 | 2,754.33 |
| Expenditures/production (b) | 56.03 | 45.83 | 62.54 | 51.89 | 58.31 | 50.14 | 44.38 | 62.38 | 42.20 | 60.20 | 53.81 | 60.81 |
| Seeds and seedlings (c) | 20.13 | **27.38** | 20.44 | 18.45 | **22.61** | 19.74 | **20.31** | 18.67 | 10.70 | **26.24** | **20.43** | 19.49 |
| Own seeds | 8.83 | 10.63 | 10.70 | 6.42 | 10.50 | 10.82 | 7.56 | 6.76 | 5.07 | 10.77 | 8.44 | 9.71 |
| Fertilizers | 0.75 | 0.51 | 0.61 | 0.84 | 0.58 | 0.59 | 0.83 | 0.85 | 1.91 | 0.40 | 0.77 | 0.70 |
| Pesticides | 1.75 | 1.58 | 1.54 | 2.09 | 1.51 | 1.34 | 1.92 | 1.64 | 8.16 | 1.09 | 1.89 | 1.45 |
| Mechanization services | **21.11** | 16.96 | **20.62** | **21.43** | 19.28 | **22.77** | 19.94 | **21.89** | 29.95 | 11.94 | 20.02 | **23.54** |
| Animals | 11.04 | 9.79 | 9.78 | 13.39 | 10.32 | 10.00 | 13.01 | 12.55 | 4.90 | 11.72 | 11.19 | 10.70 |
| Animal feed | 13.73 | 12.45 | 14.36 | 15.51 | 14.03 | 11.99 | 15.15 | 14.83 | 3.78 | 20.18 | 13.99 | 13.16 |
| Own feed | 8.84 | 8.33 | 9.07 | 9.11 | 7.94 | 10.35 | 8.89 | 7.67 | 7.32 | 7.02 | 8.81 | 8.92 |
| Transport | 3.62 | 2.57 | 3.59 | 3.41 | 3.48 | 3.87 | 3.44 | 4.32 | 3.09 | 2.27 | 3.51 | 3.86 |
| Salaries (labour) | 3.55 | 2.15 | 4.96 | 1.69 | 4.45 | 4.51 | 1.84 | 3.42 | 7.37 | 3.02 | 3.66 | 3.32 |
| Taxes and contributions | 4.18 | 5.58 | 2.64 | 4.22 | 3.95 | 2.18 | 4.20 | 4.77 | 4.56 | 4.42 | 4.59 | 3.26 |
| Land rent | 0.07 | 0.10 | 0.02 | 0.17 | 0.02 | 0.04 | 0.13 | 0.02 | 0.65 | 0.01 | 0.07 | 0.07 |
| Other expenditures | 2.39 | 1.97 | 1.66 | 3.28 | 1.32 | 1.79 | 2.77 | 2.60 | 12.54 | 0.90 | 2.65 | 1.82 |

Source: Moldova Household Budget Survey. (a) Average total farm expenditures at local prices (not harmonized all over the country); all prices are in current 2013 MDL; (b) Average ratio of total farm expenditures and the value of farm production (%); (c) For each category: average share of total farm expenditure among farms of the group considered (%); (c) Large semi-commercial farms; (d) Small subsistence farms.

**Table 13A. Farm sales decomposed into different product categories (2013).**

| Sales and products | All farms | Periph. | Centre | Subsist. | Semi-com. | Small | Medium | Large | Hiring | Autarchic | Rural | Urban |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total sales (MDL) (a) | 2,056.40 | 2,007.87 | 2,196.35 | 456.07 | 6,675.10 | 573.16 | 2,948.91 | 10,896.44 | 4,449.78 | 1,528.68 | 2,508.74 | 467.78 |
| Share sold (all farms) (b) | 12.93 | 11.83 | 16.23 | 4.41 | 41.64 | 6.39 | 18.17 | 37.16 | 22.62 | 10.69 | 15.12 | 3.80 |
| No. of selling farms (c) | 35.16 | 34.94 | 35.80 | 18.52 | 83.34 | 20.13 | 50.07 | 80.82 | 50.50 | 31.68 | 42.74 | 8.53 |
| Fruits (incl. processed) (d) | 6.93 | 5.20 | 11.80 | 9.16 | 5.51 | 8.07 | 5.90 | 8.76 | 8.13 | 6.51 | 6.12 | 21.15 |
| Wine and grapes | **20.01** | 14.64 | **35.12** | 22.40 | 18.48 | 11.40 | **24.93** | 19.63 | **30.82** | 16.18 | **19.86** | **22.67** |
| Walnuts | 17.96 | 16.39 | 22.39 | **27.29** | 12.01 | **26.34** | 15.60 | 7.05 | 16.38 | 18.52 | 18.73 | 4.43 |
| Vegetables (incl. processed) | 6.11 | 6.99 | 3.66 | 4.97 | 6.85 | 5.63 | 6.77 | 4.35 | 6.45 | 5.99 | 6.17 | 5.18 |
| Beans | 0.82 | 1.10 | 0.05 | 0.90 | 0.77 | 0.84 | 0.71 | 1.32 | 0.56 | 0.92 | 0.74 | 2.27 |
| Potatoes | 1.67 | 1.53 | 2.05 | 2.14 | 1.37 | 1.30 | 1.65 | 2.69 | 2.29 | 1.45 | 1.76 | 0.00 |
| Cereals (incl. flour) | 4.73 | 5.59 | 2.32 | 6.18 | 3.81 | 4.72 | 3.64 | 9.81 | 7.22 | 3.85 | 4.75 | 4.44 |
| Industrial plants (incl. oil) | 2.40 | 3.01 | 0.70 | 3.40 | 1.77 | 0.24 | 1.94 | 10.19 | 2.54 | 2.35 | 2.38 | 2.84 |
| Milk and dairy products | 16.50 | **18.51** | 10.85 | 5.51 | **23.51** | 17.87 | 17.02 | 10.51 | 8.31 | **19.40** | 16.74 | 12.36 |
| Eggs | 1.31 | 1.63 | 0.41 | 2.35 | 0.64 | 2.83 | 0.63 | 0.46 | 1.75 | 1.15 | 1.01 | 6.49 |
| Meat (incl. processed) | 2.10 | 2.64 | 0.56 | 1.53 | 2.46 | 2.37 | 1.81 | 2.69 | 1.84 | 2.19 | 1.92 | 5.21 |
| Living animals | 17.51 | 20.42 | 9.32 | 11.31 | 21.46 | 17.31 | 16.96 | **20.54** | 12.47 | 19.29 | 18.14 | 6.26 |
| Honey | 1.02 | 1.17 | 0.57 | 0.94 | 1.07 | 1.02 | 1.15 | 0.37 | 0.49 | 1.20 | 0.79 | 5.05 |
| Other products | 0.93 | 1.19 | 0.21 | 1.92 | 0.30 | 0.06 | 1.26 | 1.65 | 0.75 | 1.00 | 0.89 | 1.64 |

| Sales and products | All farms | Young | Old | Large | Female | Mid-low | Children | Migrants | (e) | (f) | Non-poor | Poor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total sales (MDL) (a) | 2,056.40 | 1,023.20 | 1,047.86 | 3,166.15 | 1,059.00 | 1,230.32 | 2,491.99 | 1,999.08 | 18,386.29 | 99.92 | 2,281.68 | 1,557.42 |
| Share sold (all farms) (b) | 12.93 | 8.78 | 9.53 | 13.06 | 9.40 | 10.79 | 12.26 | 13.34 | 55.00 | 1.68 | 13.73 | 11.20 |
| No. of selling farms (c) | 35.16 | 22.99 | 28.86 | 39.78 | 26.85 | 33.33 | 36.44 | 33.63 | 100.00 | 9.15 | 36.36 | 32.50 |
| Fruits (incl. processed) (d) | 6.93 | 12.05 | 6.76 | 6.87 | 9.46 | 6.20 | 6.40 | 8.18 | 10.66 | 15.15 | 6.75 | 7.37 |
| Wine and grapes | **20.01** | **17.49** | 21.91 | 14.90 | 22.91 | 20.01 | 17.26 | **25.75** | **22.85** | 13.99 | **20.85** | 17.93 |
| Walnuts | 17.96 | 16.47 | **23.29** | 12.06 | **24.62** | **23.58** | 16.18 | 10.26 | 4.20 | **38.23** | 14.53 | **26.47** |
| Vegetables (incl. processed) | 6.11 | 13.92 | 4.03 | 7.86 | 6.25 | 3.78 | 7.84 | 6.59 | 5.97 | 3.35 | 6.03 | 6.32 |
| Beans | 0.82 | 0.22 | 0.75 | 0.61 | 0.60 | 1.58 | 0.71 | 0.81 | 1.32 | 1.60 | 0.73 | 1.04 |
| Potatoes | 1.67 | 3.76 | 1.42 | 1.89 | 0.88 | 2.12 | 1.88 | 1.27 | 1.82 | 2.39 | 1.30 | 2.57 |
| Cereals (incl. flour) | 4.73 | 3.00 | 5.03 | 3.19 | 4.80 | 4.52 | 2.04 | 3.01 | 7.59 | 3.86 | 4.34 | 5.69 |
| Industrial plants (incl. oil) | 2.40 | 5.34 | 1.73 | 3.24 | 1.68 | 1.93 | 2.77 | 3.11 | 7.24 | 0.00 | 2.28 | 2.72 |
| Milk and dairy products | 16.50 | 14.33 | 13.70 | 20.06 | 12.72 | 15.35 | 19.92 | 19.14 | 13.03 | 2.34 | 19.12 | 10.01 |
| Eggs | 1.31 | 0.05 | 2.31 | 0.64 | 2.79 | 2.19 | 0.82 | 1.13 | 0.74 | 5.74 | 1.03 | 2.00 |
| Meat (incl. processed) | 2.10 | 1.55 | 1.55 | 2.93 | 0.84 | 1.74 | 2.45 | 1.52 | 3.87 | 1.91 | 2.30 | 1.60 |
| Living animals | 17.51 | 10.52 | 15.15 | **24.13** | 11.33 | 16.15 | **20.08** | 16.73 | 19.88 | 9.86 | 18.68 | 14.60 |
| Honey | 1.02 | 1.29 | 1.48 | 0.60 | 0.00 | 0.45 | 0.82 | 1.63 | 0.60 | 1.58 | 1.21 | 0.53 |
| Other products | 0.93 | 0.00 | 0.88 | 1.02 | 1.13 | 0.40 | 0.85 | 0.87 | 0.23 | 0.00 | 0.85 | 1.14 |

Source: Moldova Household Budget Survey. (a) Average value of sales at local prices (not harmonized all over the country) among all farms; prices are in current 2013 MDL; (b) Average share of sold production on total production among all farms (%); (c) Share of farms that sold something (%); (d) For each category: average share of total farm sales (%) among farms of the group considered; (e) Large semi-commercial; (f) Small subsistence.

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**Table 14A. Effect (post-treatment) of different incomes on average income per equivalent family member, counterfactual incomes, corresponding poverty and inequality.**

| Figures (2013) | | Actual | Farm | Farm (b) | Farm (c) | Salaries | Salaries (b) | Remittances | Pensions | Welfare | Business |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Post-treatment mean effect (MDL) (a) | | NA | -681.98 | -306.03 | 324.29 | 2,688.90 | 3,395.39 | 12,546.35 | -7,067.57 | -3,754.21 | 3,611.49 |
| Bootstrapped mean effect (MDL) | | NA | 357.03 | -116.38 | 200.05 | 4,659.45 | 4,395.14 | 11,310.22 | 245.56 | -1,887.13 | 4,695.96 |
| Counterfactual income (MDL) | Average | 25,765.66 | 25,635.71 | 27,474.85 | 27,113.95 | 23,116.16 | 22,500.74 | 22,884.72 | 27,906.08 | 26,138.67 | 25,374.31 |
| | Minimum | -5,116.51 | -5,116.51 | -5,116.51 | -5,116.51 | -5,116.51 | -5,116.51 | -5,116.51 | -5,116.51 | -4,113.29 | -5,116.51 |
| | First quartile | 14,384.08 | 13,758.24 | 14,260.19 | 14,260.19 | 12,400.20 | 12,480.00 | 13,494.09 | 14,225.16 | 14,384.08 | 14,114.83 |
| | Median | 20,860.45 | 21,023.00 | 23,256.00 | 23,103.12 | 17,067.91 | 17,148.00 | 18,613.72 | 24,000.00 | 21,325.85 | 20,432.90 |
| | Third quartile | 31,764.71 | 33,487.29 | 35,590.91 | 35,185.88 | 26,833.19 | 26,246.47 | 29,454.54 | 35,454.54 | 32,534.12 | 31,099.04 |
| | Maximum | 327,483.00 | 188,582.50 | 188,582.50 | 188,582.50 | 327,483.00 | 327,483.00 | 188,582.50 | 327,483.00 | 327,483.00 | 327,483.00 |
| | Average (rural) | 21,576.19 | 20,735.86 | 21,881.79 | 21,701.26 | 20,824.40 | 21,055.57 | 18,565.80 | 23,213.35 | 22,082.74 | 21,507.91 |
| | Average (urban) | 30,792.59 | 31,207.81 | 31,295.85 | 30,869.15 | 26,162.74 | 24,424.92 | 28,064.13 | 33,383.46 | 31,014.68 | 30,017.08 |
| | Median (rural) | 17,397.28 | 15,256.64 | 16,496.47 | 16,872.00 | 15,981.56 | 16,343.28 | 16,311.76 | 19,210.27 | 17,925.36 | 17,176.85 |
| | Median (urban) | 26,823.53 | 27,744.58 | 27,840.00 | 27,034.76 | 19,350.00 | 18,415.65 | 24,705.72 | 29,705.00 | 26,854.21 | 25,977.78 |
| Poverty headcount | Total | 24.90 | 28.32 | 24.79 | 25.09 | 36.88 | 35.66 | 29.90 | 26.67 | 24.52 | 26.55 |
| | Rural areas | 33.34 | 42.20 | 40.03 | 39.89 | 41.75 | 38.87 | 39.28 | 36.29 | 31.95 | 35.06 |
| | Urban areas | 13.71 | 11.52 | 13.11 | 13.68 | 29.34 | 30.73 | 17.52 | 14.05 | 14.70 | 15.26 |
| | Farmers | 31.34 | 36.92 | 34.76 | 35.24 | 39.61 | 37.65 | 37.36 | 34.02 | 30.15 | 33.16 |
| Gini index (income per equivalent member) | | 0.334 | 0.347 | 0.339 | 0.339 | 0.390 | 0.377 | 0.319 | 0.360 | 0.338 | 0.338 |

Source: Author's elaboration on Moldova Household Budget Survey data. (a) All incomes are in current 2013 MDL; (b) Propensity score calculated on local PSU (hypothesis of no mobility). (c) Propensity score calculated on local PSU and remittances (strict hypothesis of no mobility).

**Table 15A. Self-assessed life level (min. 1 – max. 5) and counterfactual life level after propensity score matching (2013).**

| Group | Index | Actual | (a) | (b) | (c) | (d) | (e) | (f) | (g) |
|---|---|---|---|---|---|---|---|---|---|
| Average effect (post-treatment) | | NA | 0.370 | 0.138 | 0.144 | 0.194 | 0.226 | -0.135 | -0.113 |
| Bootstrapped average effect | | NA | 0.242 | 0.113 | 0.135 | 0.247 | 0.240 | -0.082 | -0.226 |
| Counterfactual life level (total population) | Average | 2.904 | 2.689 (***) | 2.885 (.) | 2.832 (***) | 2.864 (***) | 2.750 (***) | 2.967 (***) | 2.920 |
| | Positive (%) | 10.45 | 9.88 | 9.83 | 9.63 | 8.50 | 5.21 | 15.79 | 11.38 |
| | Negative (%) | 18.73 | 39.76 | 19.93 | 24.25 | 20.64 | 28.49 | 18.34 | 17.91 |
| Counterfactual life level (rural dwellers) | Average | 2.945 | 2.438 (***) | 2.923 (.) | 2.834 (***) | 2.892 (***) | 2.738 (***) | 2.945 | 2.945 |
| | Positive (%) | 11.83 | 10.64 | 11.04 | 10.44 | 8.76 | 5.20 | 11.83 | 11.83 |
| | Negative (%) | 16.55 | 66.87 | 17.91 | 25.00 | 18.64 | 29.92 | 16.55 | 16.55 |
| Counterfactual life level (urban dwellers) | Average | 2.855 | 2.870 | 2.840 | 2.829 (.) | 2.830 | 2.765 (***) | 3.014 (***) | 2.890 (.) |
| | Positive (%) | 8.81 | 9.33 | 8.36 | 8.65 | 8.20 | 5.22 | 24.21 | 10.84 |
| | Negative (%) | 21.33 | 20.22 | 22.34 | 23.34 | 23.05 | 26.77 | 22.17 | 19.55 |
| Counterfactual life level (farmers) | Average | 2.922 | 2.512 (***) | 2.903 | 2.817 (***) | 2.879 (***) | 2.733 (***) | 2.934 | 2.922 |
| | Positive (%) | 10.66 | 9.21 | 10.03 | 9.50 | 8.31 | 4.91 | 11.33 | 10.49 |
| | Negative (%) | 17.51 | 57.36 | 18.69 | 25.50 | 19.35 | 30.03 | 17.21 | 17.25 |

Source: Author's elaboration on Moldova Household Budget Survey data. (a) Land ownership; (b) Presence of migrants in the family; (c) Poultry ownership; (d) Car ownership; (e) Good health conditions; (f) Residence in urban areas; (g) Residence in Chișinău. Significance of differences from actual values: *** < 0.001; ** < 0.010; * < 0.050; . < 0.100.

**Table 16A. Indicators of food security for farming and non-farming households (2013).**

| Group and indicator | | All | Periph. | Centre | Rural | Urban | Non-poor | Poor | Young | Old | Large | Woman | Mid-low | Children | Migrants |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Farmers | Mean subsistence (a) | 28.00 | 30.28 | 21.43 | 32.84 | 11.04 | 27.79 | 28.47 | 21.05 | 26.96 | 29.99 | 24.74 | 28.70 | 27.74 | 27.30 |
| | Median subsistence (b) | 25.73 | 28.74 | 18.92 | 31.31 | 8.16 | 25.63 | 26.09 | 19.08 | 25.08 | 27.14 | 23.08 | 27.45 | 24.78 | 25.66 |
| | Mean food/income (c) | 59.48 | 59.45 | 59.56 | 57.54 | 57.35 | 49.47 | 81.65 | 57.65 | 62.51 | 57.80 | 61.60 | 63.42 | 58.60 | 52.74 |
| | Median food/income (d) | 57.17 | 57.18 | 57.16 | 60.08 | 55.75 | 47.92 | 84.61 | 55.09 | 61.20 | 54.07 | 60.36 | 61.46 | 55.55 | 46.60 |
| | Food >100% (e) | 11.77 | 11.33 | 13.04 | 13.17 | 6.83 | 1.59 | 34.31 | 14.24 | 10.15 | 12.30 | 12.67 | 12.39 | 12.78 | 12.76 |
| | Difficulty in paying (f) | 34.77 | 34.92 | 34.35 | 35.18 | 33.32 | 30.33 | 44.60 | 35.20 | 34.86 | 39.28 | 35.75 | 40.89 | 38.82 | 29.58 |
| Non-farmers | Mean food/income (c) | 50.69 | 52.66 | 49.77 | 56.07 | 50.53 | 47.00 | 80.71 | 41.71 | 60.15 | 47.50 | 54.52 | NA | 46.51 | 45.07 |
| | Median food/income (d) | 47.06 | 49.44 | 46.48 | 54.00 | 46.81 | 44.52 | 83.30 | 37.63 | 59.79 | 45.56 | 50.92 | NA | 45.10 | 38.07 |
| | Food >100% (e) | 4.70 | 5.07 | 4.53 | 3.06 | 4.75 | 1.55 | 30.37 | 0.81 | 7.18 | 1.79 | 7.75 | NA | 3.03 | 5.15 |
| | Difficulty in paying (f) | 41.79 | 35.11 | 44.90 | 46.85 | 41.64 | 40.40 | 53.07 | 29.42 | 52.28 | 37.50 | 45.16 | NA | 40.25 | 19.78 |

Source: Moldova Household Budget Survey. (a) Mean share of consumed self-produced food on total food expenditure of the household (%); (b) Median share of consumed self-produced food on total food expenditure of the household (%); (c) Mean share of food expenditure on household income (%); share = 100 if food expenditure overcomes total family earnings; (d) Median share of food expenditure on household income (%); (e) Share of households whose food expenditure exceeds household income (%); (f) Share of households which declared to have difficulties in paying for food (%).

**Table 17A. Multinomial logistic regression for self-assessed life level (2013).**

| Number of strata: 1 | | Number of observations: 5,082 | | | | | |
|---|---|---|---|---|---|---|---|
| Subpopulation number of observations: 5,082 | | Population size: 1,383,011.8 | | | | | |
| Design degrees of freedom: 5,081 | | $F_{(14, 5068)} = 36.16$ | | | Prob. > F = 0 | | |

| Self-assessed life level (2013) | | Coeff. | St. err. | t | P>|t| | 95% conf. int. | | Δ odd r. |
|---|---|---|---|---|---|---|---|---|
| Negative | Owned land (ha) | -0.159 | 0.042 | -3.76 | 0.000 | -0.242 | -0.076 | -14.69% |
| | Expenditure for clothes (1,000 MDL) | -1.036 | 0.174 | -5.94 | 0.000 | -1.377 | -0.694 | -64.50% |
| | Gap between income and decent income (%) | -0.723 | 0.001 | -8.58 | 0.000 | -0.009 | -0.006 | -51.45% |
| | Car ownership (dummy) | -0.875 | 0.180 | -4.86 | 0.000 | -1.228 | -0.522 | -58.32% |
| | Bad health status of head (dummy) | 1.022 | 0.102 | 10.04 | 0.000 | 0.822 | 1.222 | 177.90% |
| | At least a family member abroad (dummy) | -0.391 | 0.160 | -2.45 | 0.014 | 0.078 | 0.703 | -32.35% |
| | Residence in Chișinău or Bălți (dummy) | 0.675 | 0.132 | 5.12 | 0.000 | 0.417 | 0.934 | 96.50% |
| | Constant term | -1.837 | 0.316 | -5.82 | 0.000 | -2.456 | -1.218 | |
| Neutral (base outcome) | | | | | | | | |
| Positive | Owned land (ha) | 0.067 | 0.028 | 2.37 | 0.018 | 0.012 | 0.123 | 6.96% |
| | Expenditure for clothes (1,000 MDL) | 0.453 | 0.095 | 4.78 | 0.000 | 0.267 | 0.639 | 57.36% |
| | Gap between income and decent income (%) | 0.232 | 0.001 | 4.36 | 0.000 | 0.001 | 0.003 | 26.09% |
| | Car ownership (dummy) | 0.629 | 0.122 | 5.17 | 0.000 | 0.391 | 0.868 | 87.61% |
| | Bad health status of head (dummy) | -0.819 | 0.221 | -3.71 | 0.000 | -1.252 | -0.386 | -55.93% |
| | At least a family member abroad (dummy) | -0.499 | 0.131 | -3.82 | 0.000 | -0.756 | -0.243 | 64.76% |
| | Residence in Chișinău or Bălți (dummy) | -0.294 | 0.171 | -1.72 | 0.085 | -0.629 | 0.041 | -25.47% |
| | Constant term | -1.479 | 0.260 | -5.70 | 0.000 | -1.988 | -0.970 | |

Source: Author's elaboration on Moldova Household Budget Survey data.
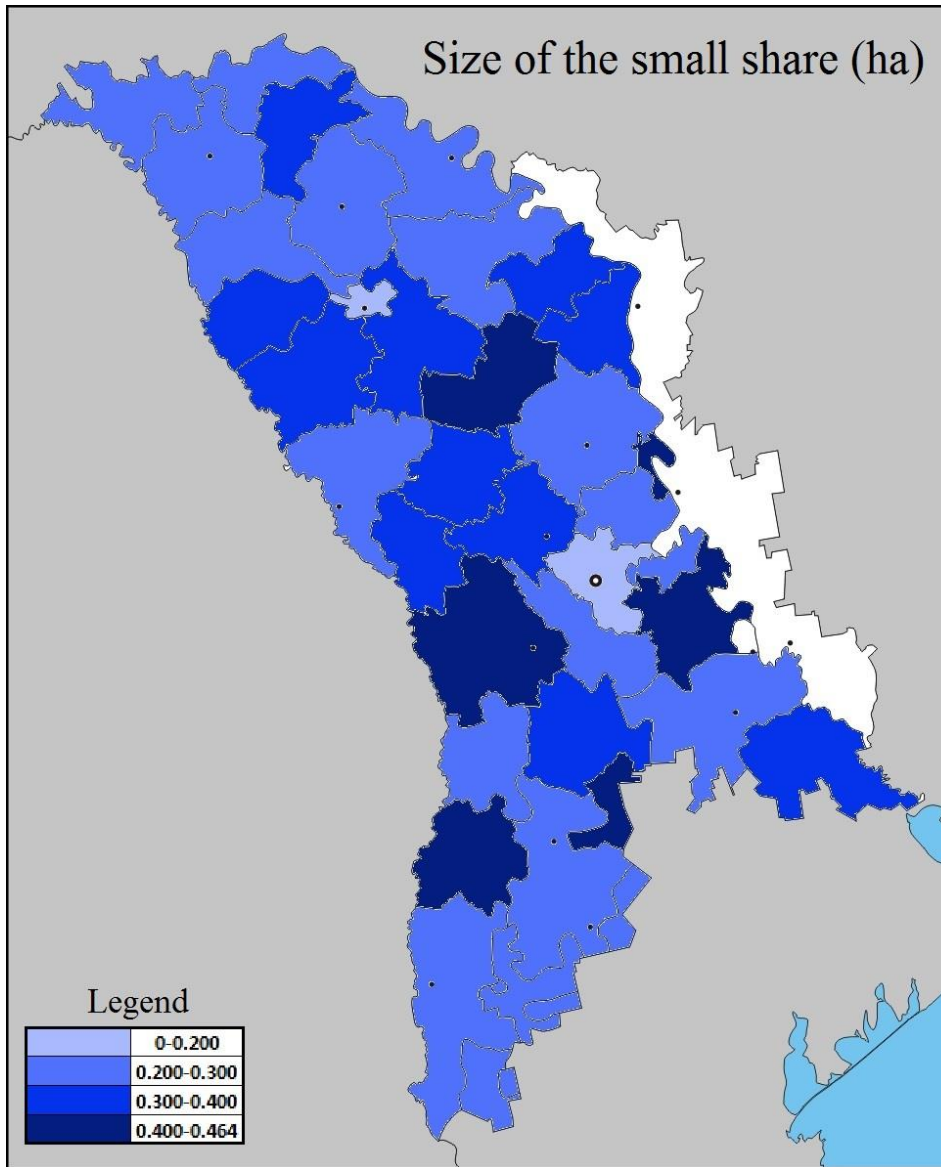
## C. Maps

The following maps contain relevant data at district level (including Chişinău and Bălţi municipalities and Găgăuzia autonomous region) in 2013.
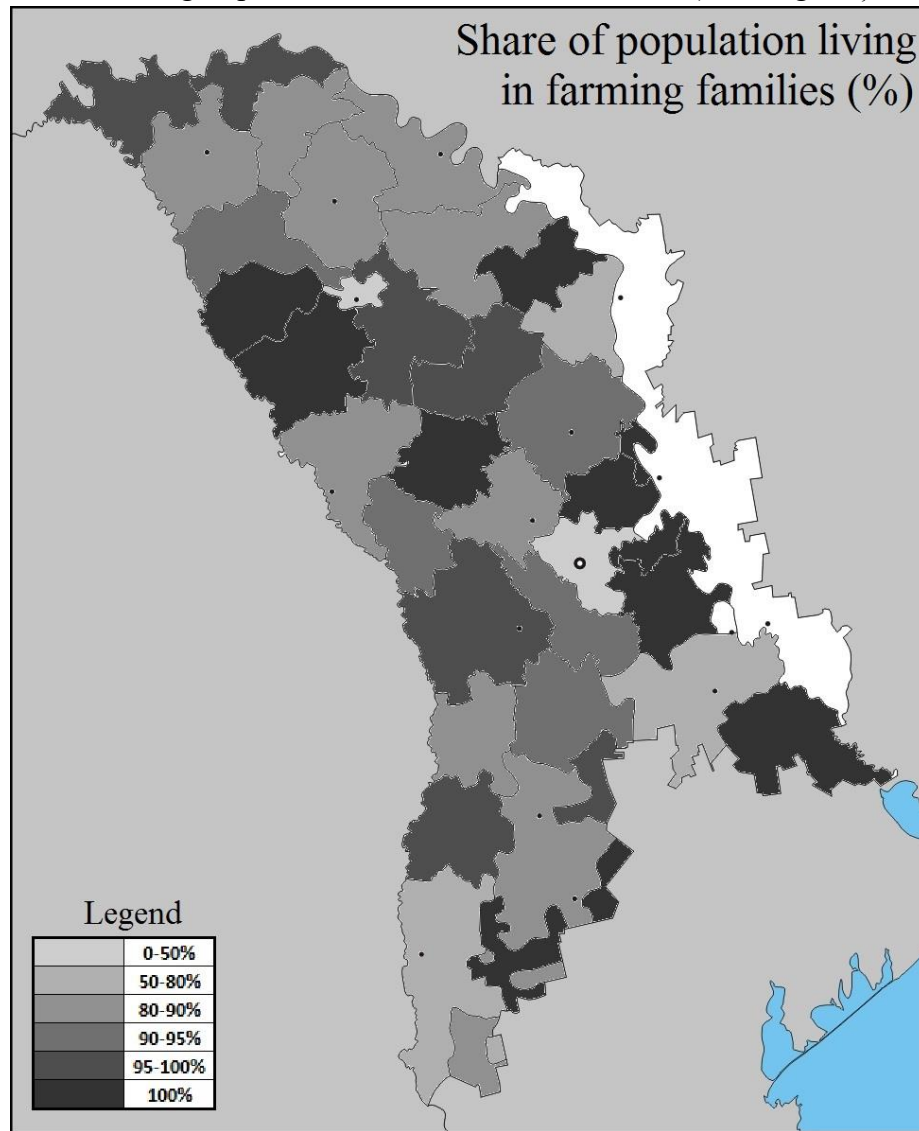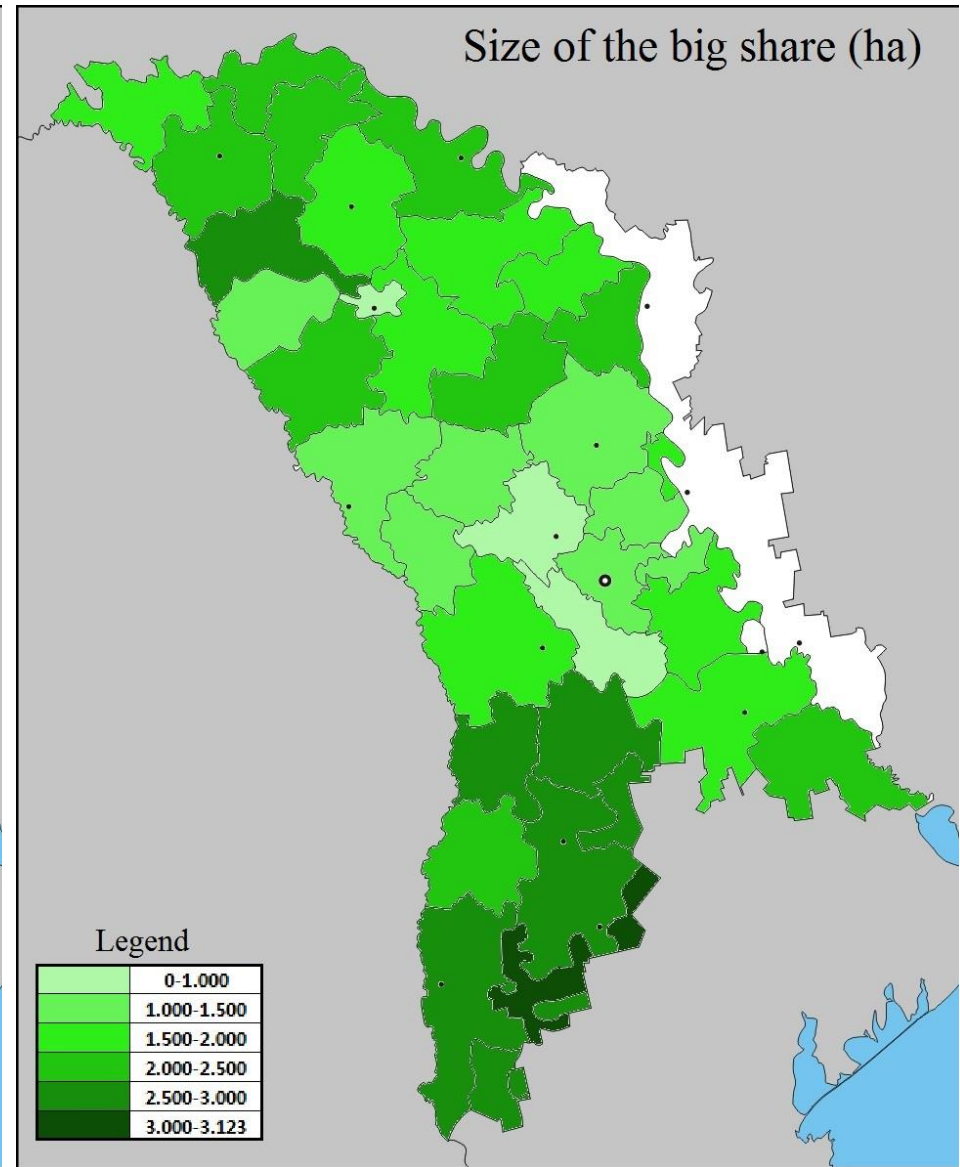


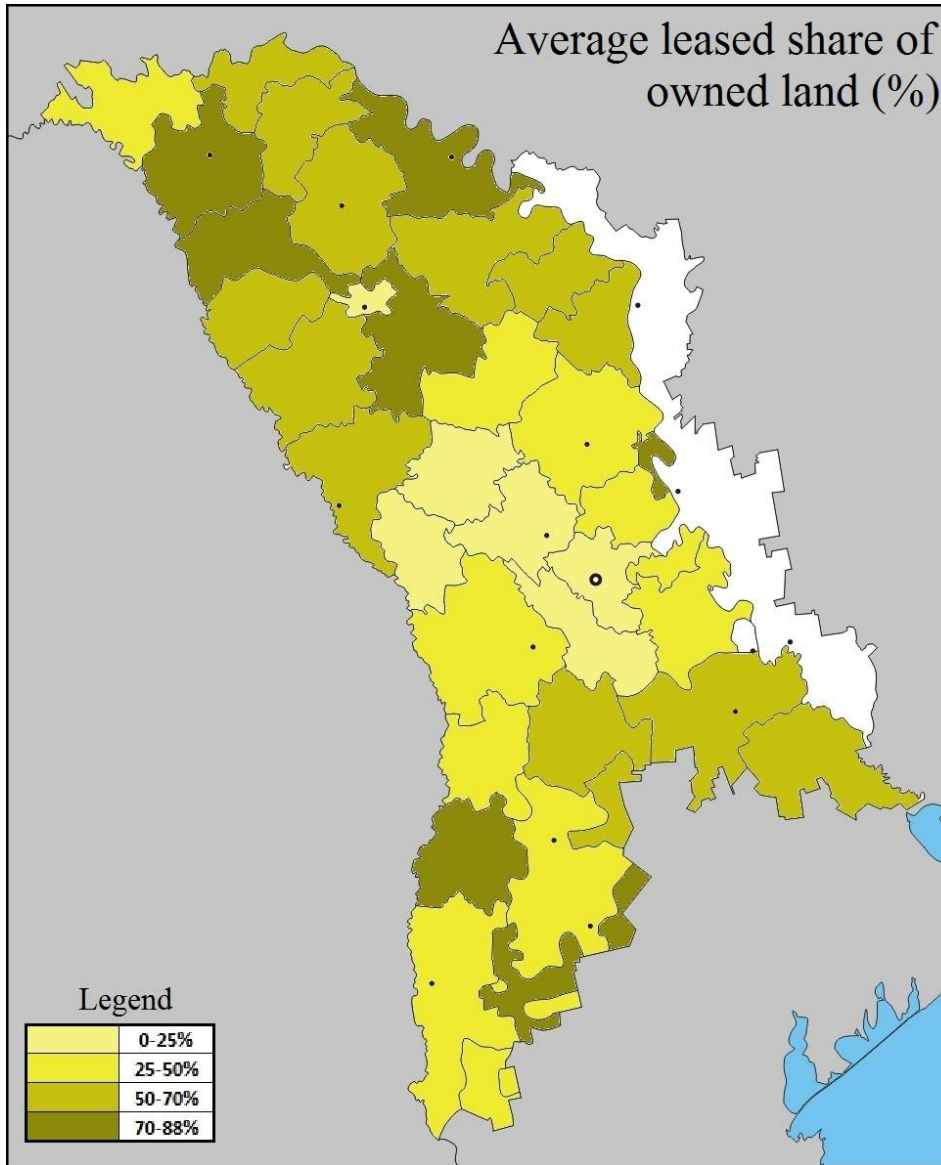**Map 1A. Share of population living in farm households out of total (%).**
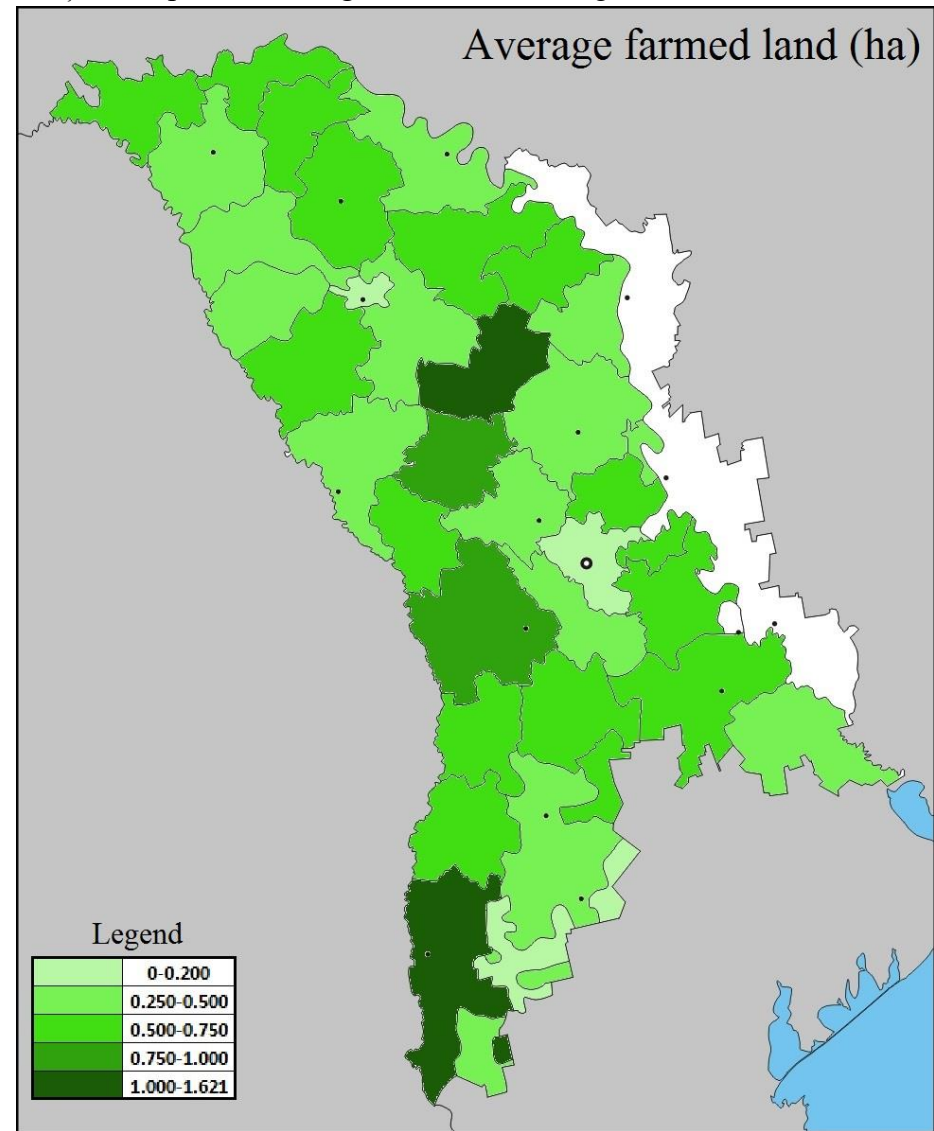


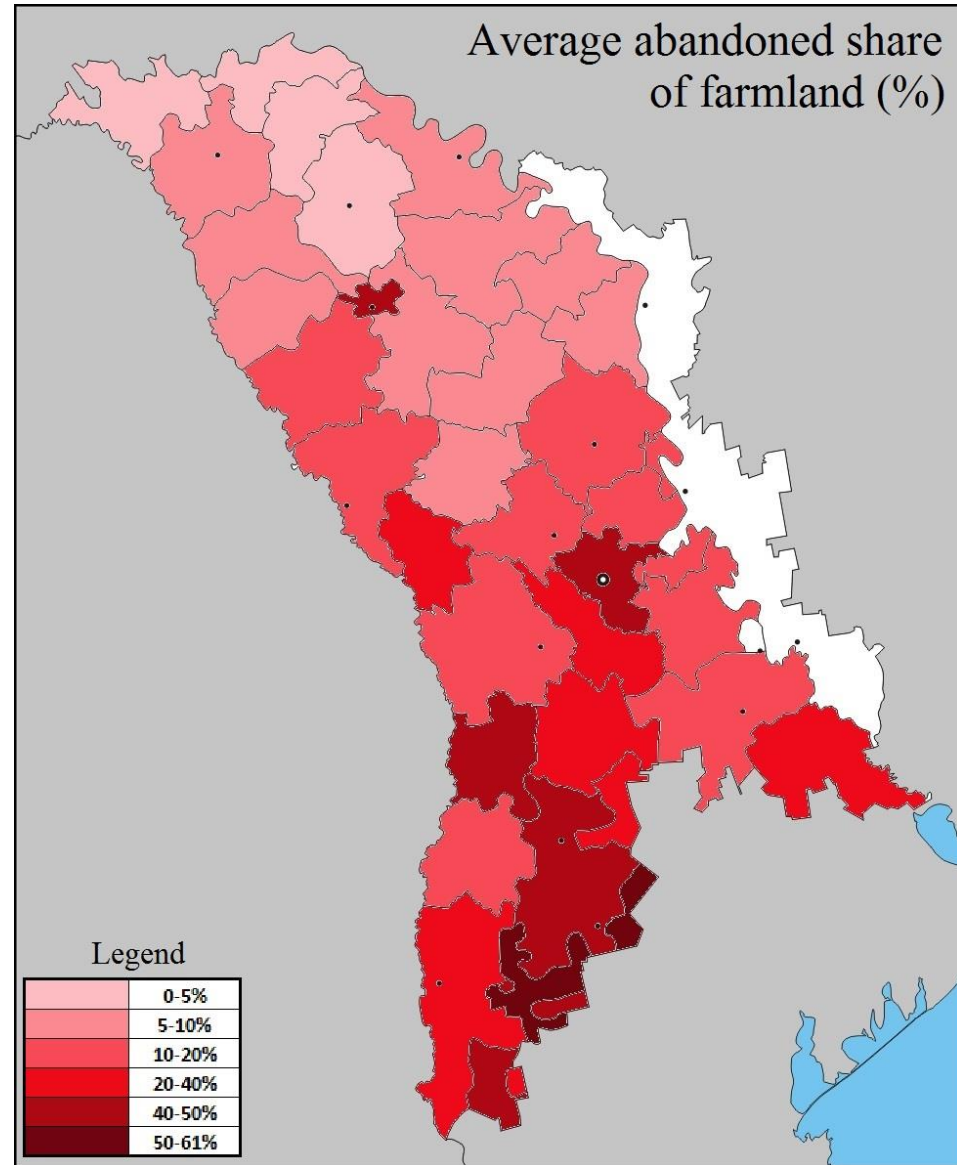**Map 2A. Average farmed land per farm household (ha).**

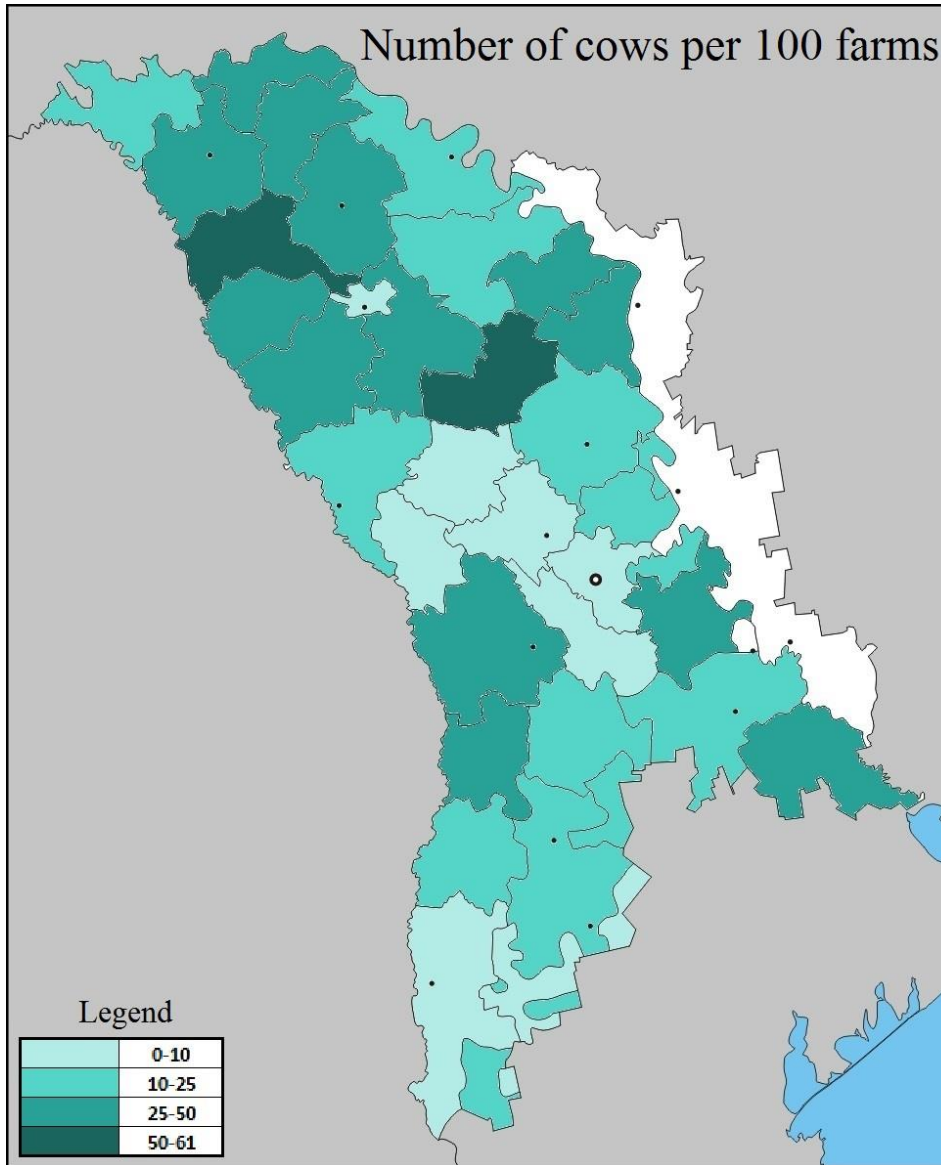**Map 3A. Average size of the house garden and small share together (ha).**

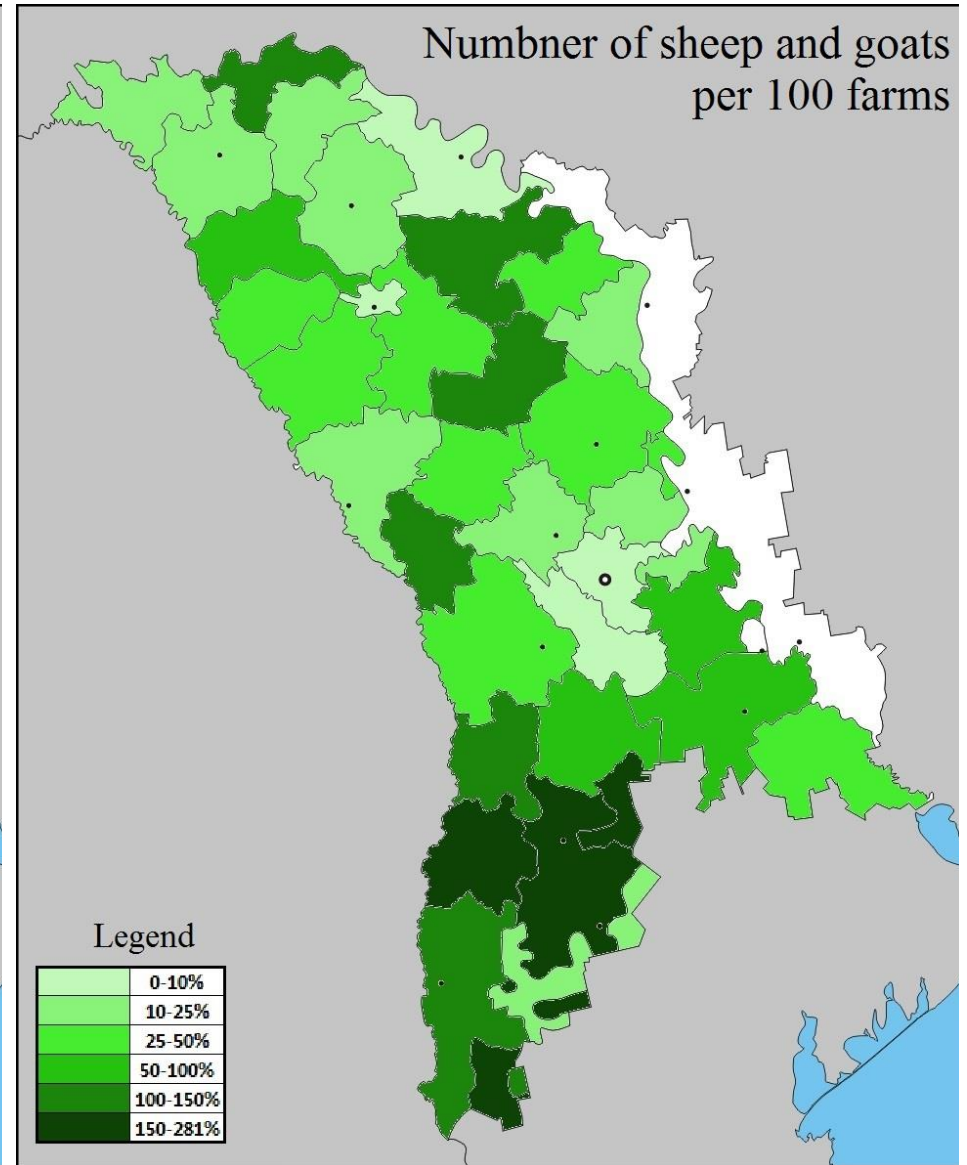**Map 4A. Average area of the big share only for households owning one (ha).**

Average leased share of owned land (%)

Legend
0-25%
25-50%
50-70%
70-88%

Average abandoned share of farmland (%)

Legend
0-5%
5-10%
10-20%
20-40%
40-50%
50-61%

**Map 5A. Average share of leased land on owned land (%).**　　**Map 6A. Average share of abandoned land on available farmland (%).**

Number of cows per 100 farms

Legend

| | 0-10 |
| | 10-25 |
| | 25-50 |
| | 50-61 |

Numbner of sheep and goats per 100 farms

Legend

| | 0-10% |
| | 10-25% |
| | 25-50% |
| | 50-100% |
| | 100-150% |
| | 150-281% |

**Map 7A. Average number of cows per 100 family farms.**

**Map 8A. Average number of sheep and goats per 100 family farms.**

**Number of pigs per 100 farms**

Legend
| | |
|---|---|
| | 0–10 |
| | 10–25 |
| | 25–50 |
| | 50–90 |
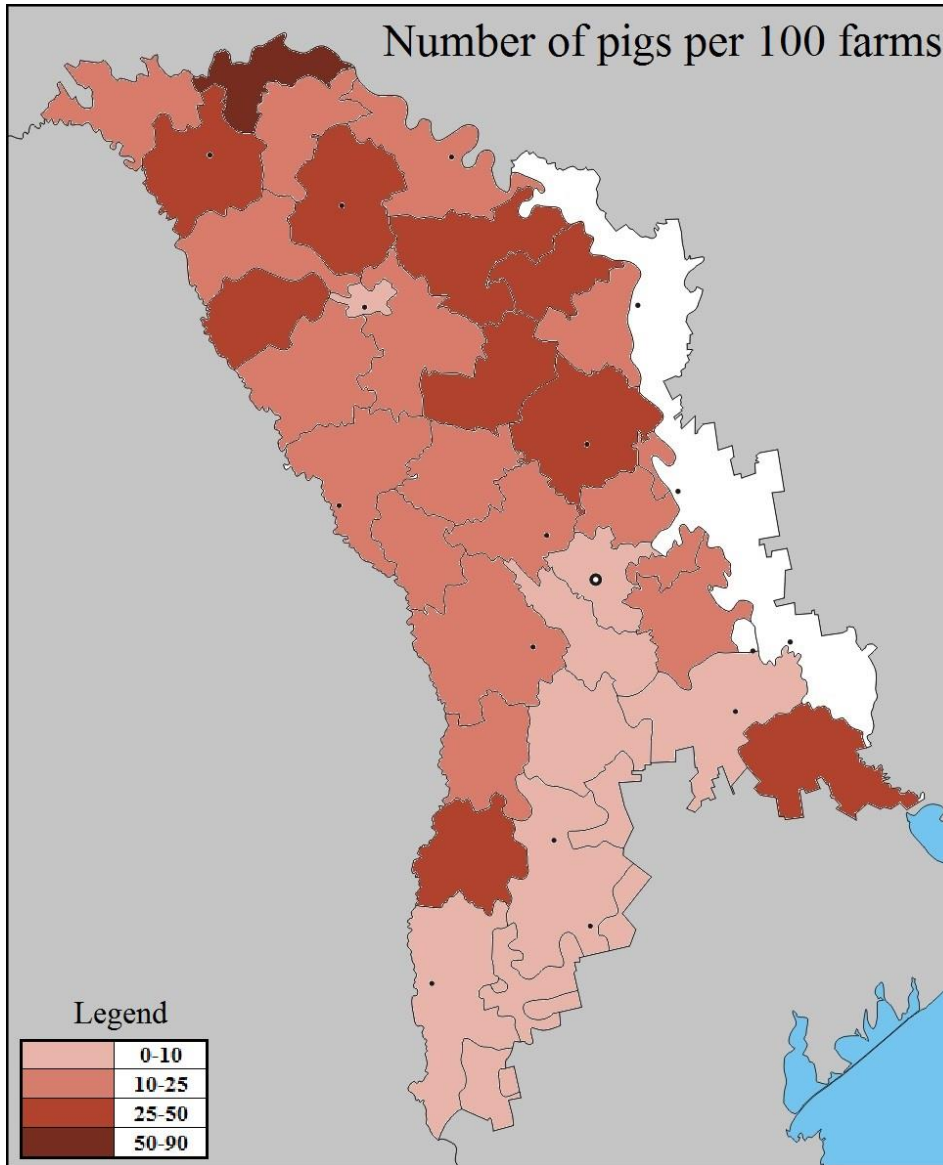
**Map 9A. Average number of pigs per 100 family farms.**

**Poultry animals per 100 farms**

Legend
| | |
|---|---|
| | 0–1,000 |
| | 1,000–1,750 |
| | 1,750–2,500 |
| | 2,500–3,069 |
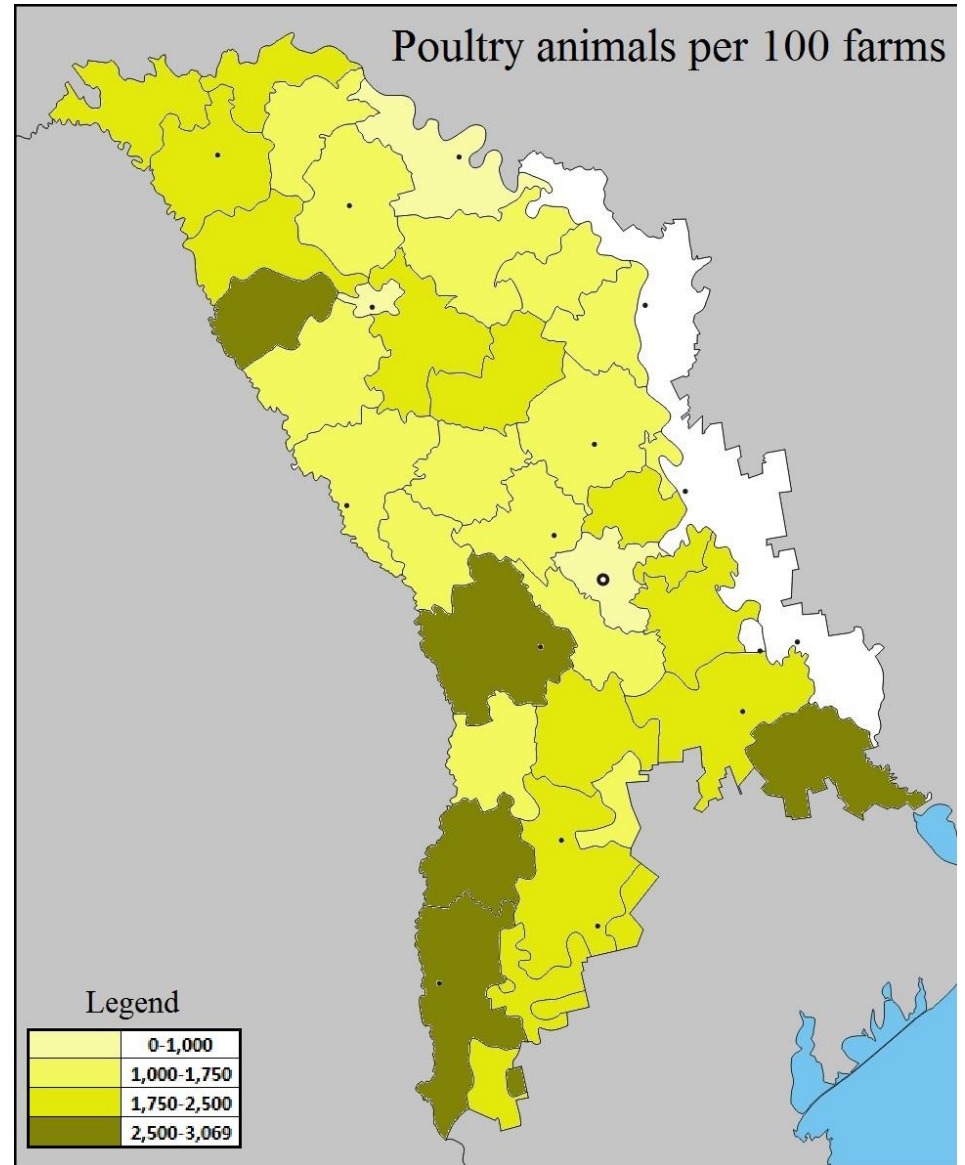
**Map 10A. Average number of poultry animals per 100 family farms.**
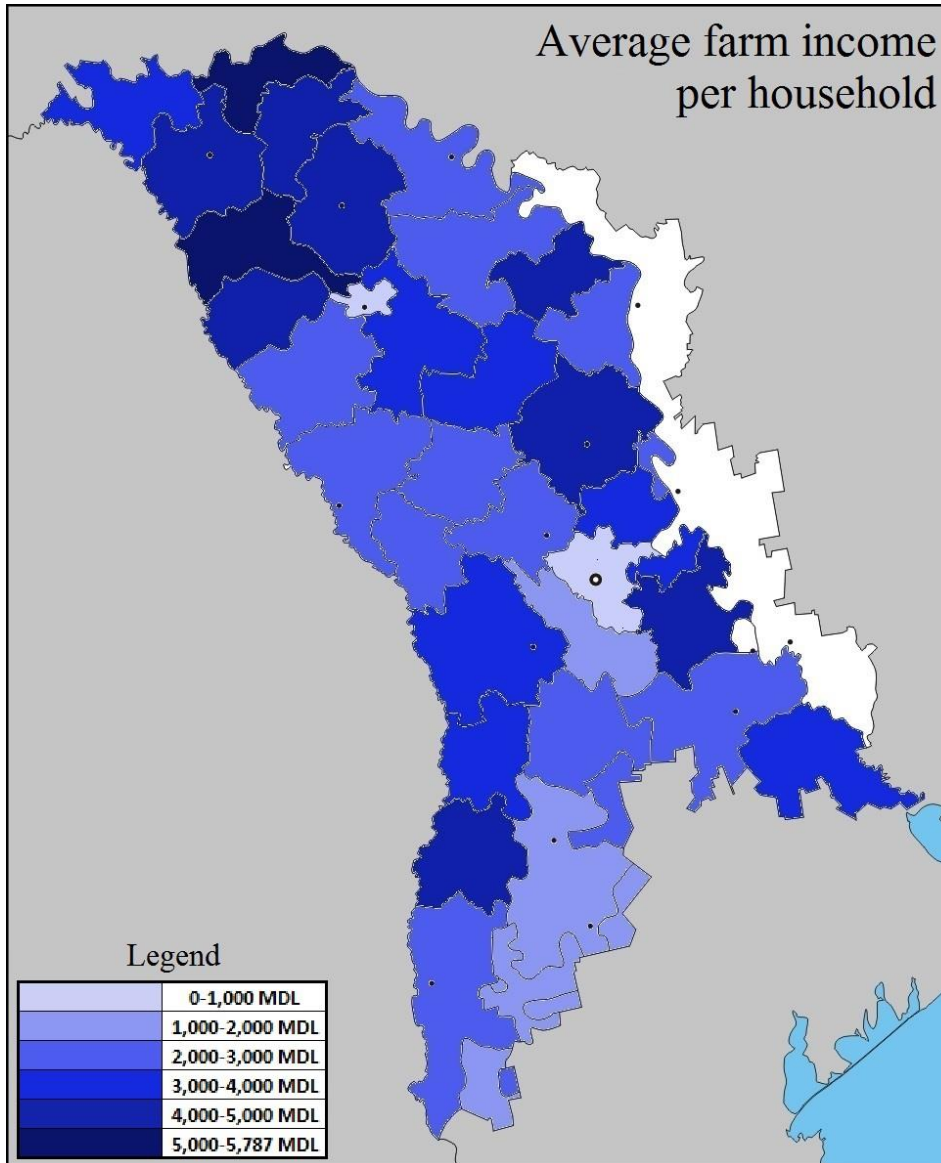
**Map 11A. Average yearly farm income per equivalent household member in family farms (MDL).**
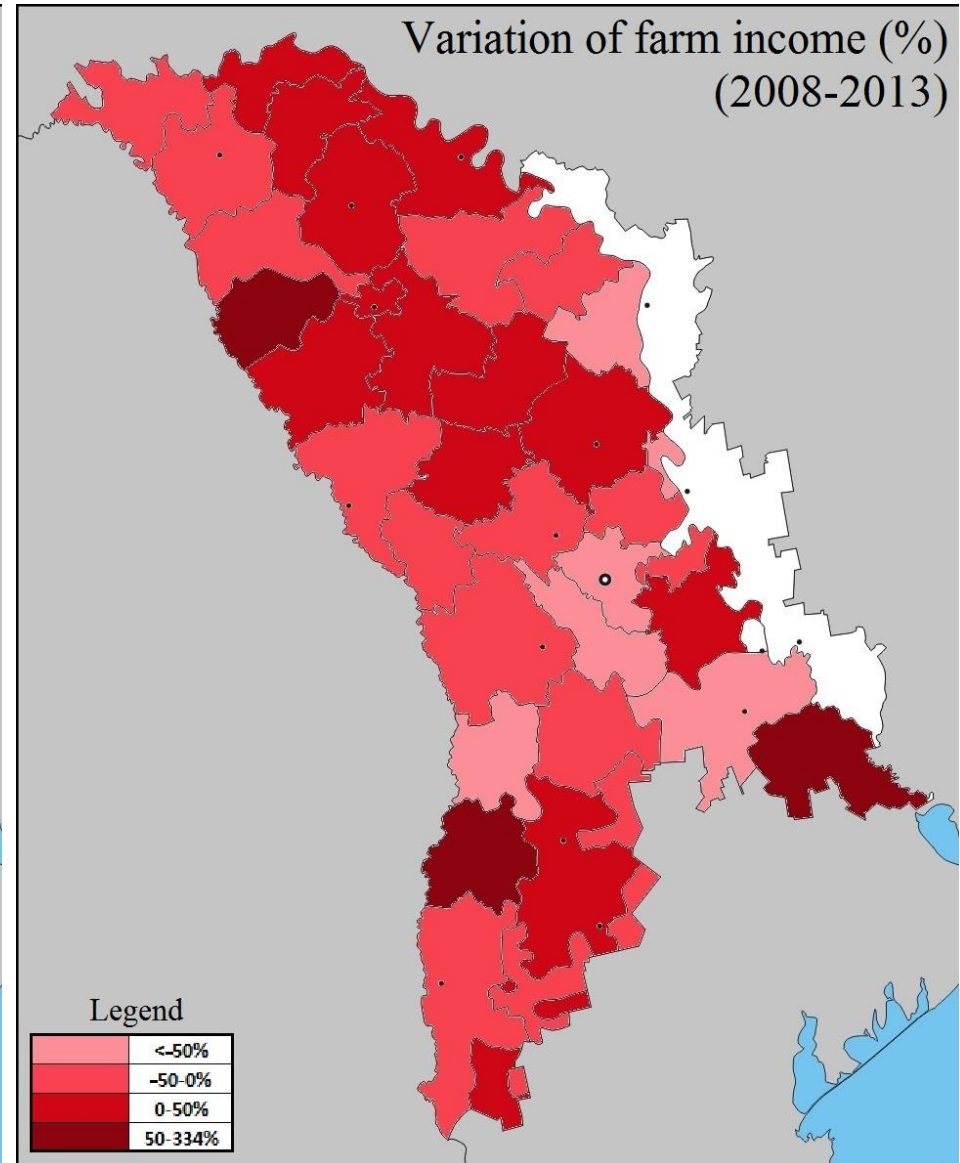
**Map 12A. Variation of farm income per equivalent household member from 2008 to 2013 (%).**

Marketed share of production (%)

Legend

| | |
|---|---|
| | 0-5% |
| | 5-10% |
| | 10-20% |
| | 20-32% |
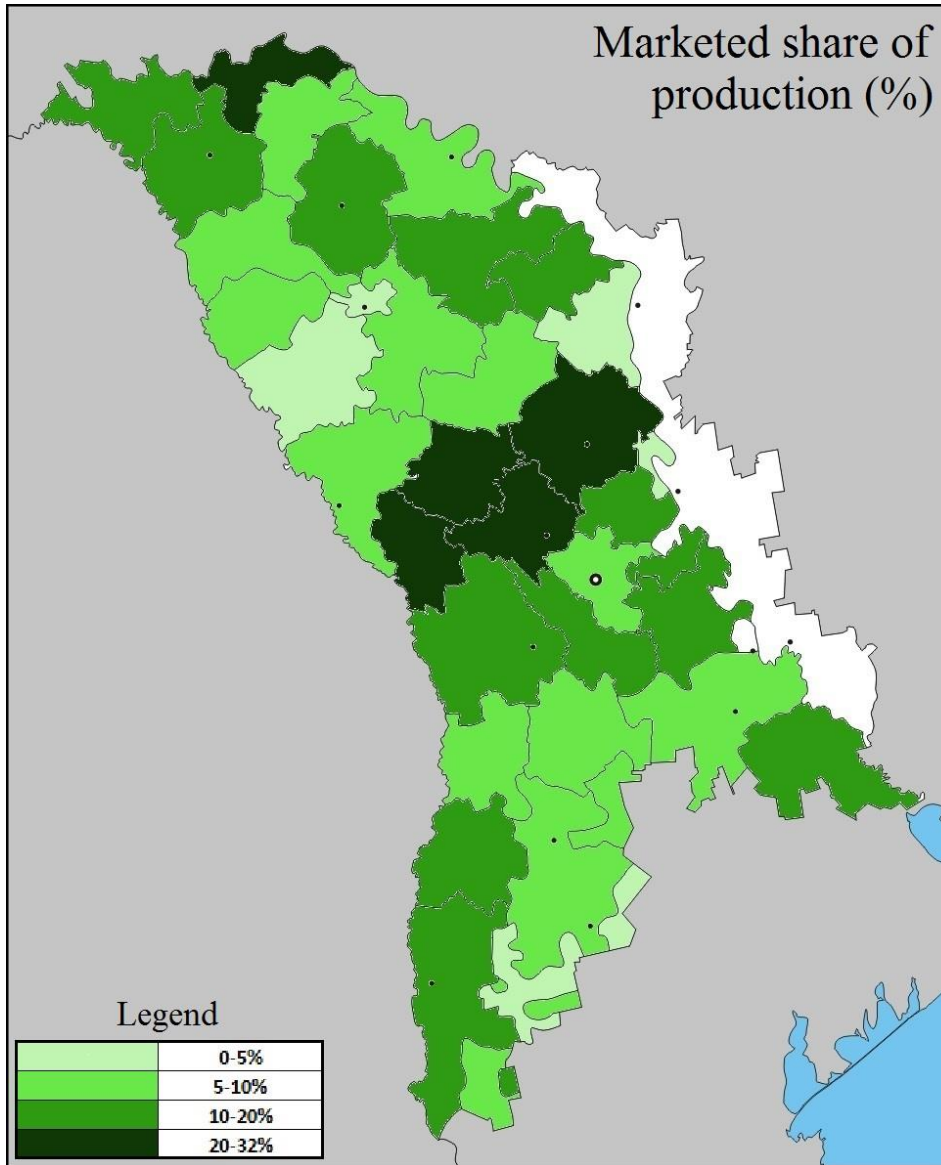
**Map 13A. Average share marketed out of total farm production (%).**

Share of subsistence on total food consumption (%)

Legend

| | |
|---|---|
| | 0-10% |
| | 10-25% |
| | 25-33% |
| | 33-42% |
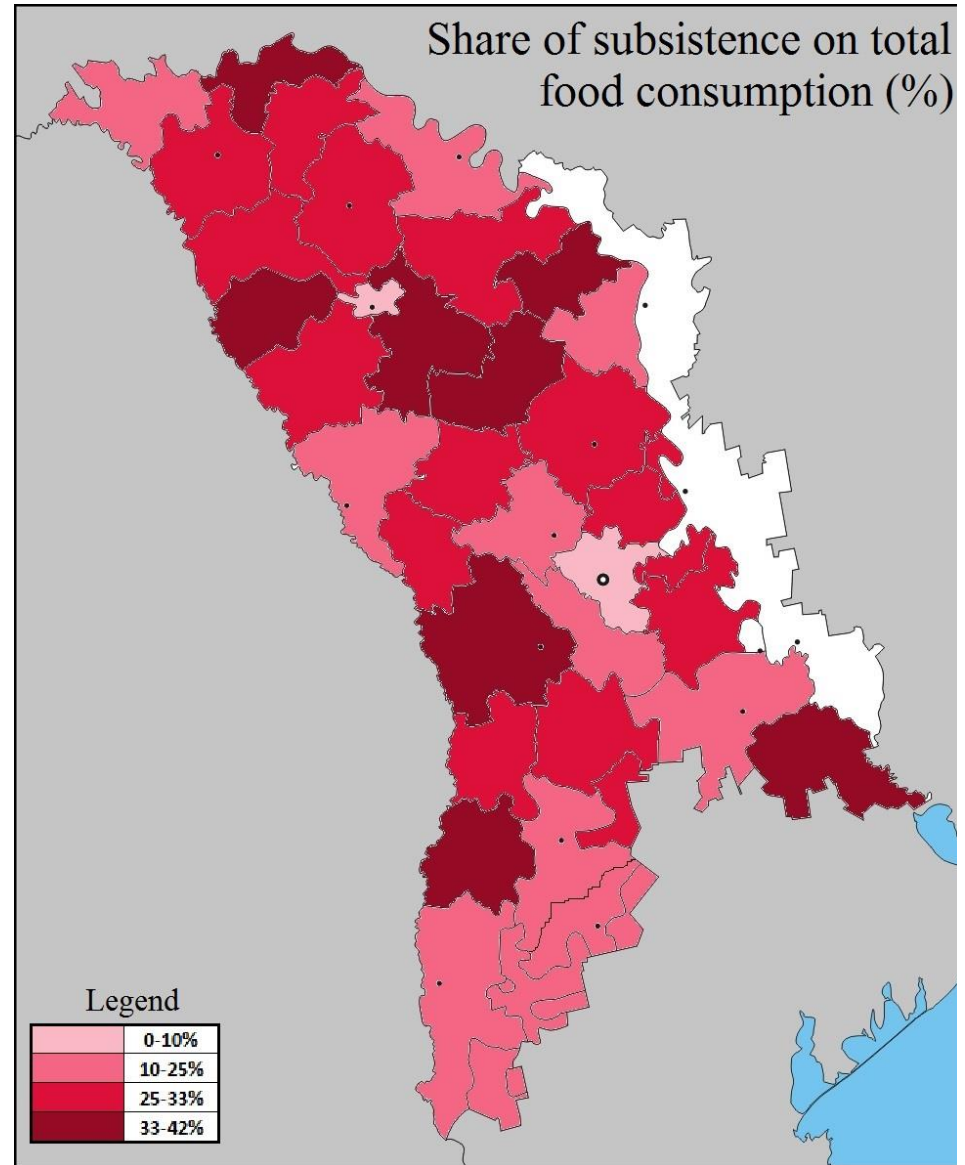
**Map 14A. Average share of subsistence food out of total food expenditure for all families (%).**

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