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Socio-Economic Determinants of Small Family Farms' Resilience in Selected Central and Eastern European Countries

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Abstract: We investigated the resilience of small-scale family farms because of the contemporary importance of both the farms' resilience and the role of these farms in five countries of Central and Eastern Europe. The authors addressed a research gap concerning cross-sectional research on the resilience of farms by combining determinants from various fields. Thus, the primary goal of this article was to identify microeconomic and political factors and links to markets that affect the resilience of small-scale family farms in Lithuania, Moldova, Poland, Romania and Serbia. Using a database of over 3500 farms, the resilience of the farms was calculated, and then the impact of selected factors on that resilience was determined. The research showed that the production scale was the key determinant of the resilience of farms. To achieve higher benefits, increasing the production should be combined with strengthening the market integration of agricultural producers. The position of the producer in the food supply chain determined the income situation of the farm (economic stability). This shaped the quality of life of the family members (social stability). Identifying the effects of those dependencies may provide recommendations for the policy of supporting small-scale family farms in the analysed countries.

Keywords: small-scale family farms; resilience; agriculture; sustainable development; Lithuania; Moldova; Poland; Romania; Serbia

1. Introduction

In the debate on the sustainability of the agricultural sector, there is a discussion about the role of small-scale family farms regarding its implementation. The significance of small farms has been questioned many times in the literature. Traditional technology, inefficient use of scarce resources [1] and poverty [2] are emphasised while thinking about these units. Small farms are treated as an unwanted phenomenon and as impediments to rural growth [3]. They are seen to have low efficiency

and productivity, with weak integration into markets, which results in insufficient household income [4]. However, we must take into account that small family farms and related rural areas are places of residence and work for nearly 50% of the world's population. Out of 570 million farms in the world, the vast majority are small-scale farms, where the smallest ones, up to 2 ha, make up approx. 475–500 million of these [5,6], especially in poorer countries. From this point of view, the role of these households in the development of rural areas and the entire economy cannot be underestimated. While in the second half of the twentieth century, the shrinking number of small farms caused by an inability to compete with efficient agribusiness was treated as a natural process, in recent years, this perception has changed, and in the 21st century, the position of small family farms is growing [7]. Simultaneously, the view on agribusiness development has changed from promoting industrial agriculture (with large-scale farms) to promoting more sustainable agriculture, taking into account three spheres: (1) economic, which is related to the factors of productivity (land, labour and capital) and the income of agricultural producers; (2) social, which determines the quality of life in rural areas; (3) environmental, which is aimed at protecting valuable natural resources. A special role in this paradigm is played by small-scale family farms whose tasks go beyond only food production; they also concern the provision of social and environmental public goods [8–10]. Researchers emphasise the role of smallholders in economic growth, reducing poverty and ensuring food security, mainly in developing regions of the globe. They suggest that growth in small-scale agriculture has higher multiplier effects than in any other sector [11–14]. Furthermore, small farms have a positive influence on developing the density of the rural population, including the borderland and less beneficial territories. Hence, to some extent, they are responsible for rural viability [15]. Small family farms allow producers to survive under difficult and risky conditions, and they can stabilise fragile conditions in agricultural activity to some extent [16]. There is also an important role of small farms in their contribution to the creation and protection of cultural and natural heritages. Finally, small-scale farming is treated as more environmentally friendly since it provides benefits, such as conserving biodiversity, limiting the consumption of fertilisers and pesticides and guaranteeing animal welfare. Bharucha [17] calls them "true pioneers of climate-smart agriculture". Thus, they can implement sustainable intensification around the world, especially in countries with a fragmented agrarian structure. Obviously, countries with big agricultural potential might ensure food security or food sovereignty more easily at the national level. However, small farms could play an important role in this process. On the one hand, in the European Union (EU), the very small farms are at the (semi-)subsistence end of the farming scale. About three-quarters of such farms in the EU consumed more than one half of their production [18]. On the other hand, the scale of food production in small farms is relevant as well. Some authors investigated and reported on the amount of food produced by small farms (with different farm areas) at a global scale. Some of their results are as follows:

- Riccardi et al. [19]: farms under 2 ha produce 30–34% of the food supply, while farms below 5 ha produce 44–48% of the food supply.
- Herrero et al. [20]: farms under 2 ha produce 18% of the food supply.
- Samberg et al. [21]: depending on estimations, farms under 2 ha produce 37–52% and farms under 5 ha produce 55–76% of the global food supply.

In Poland, less than 70% of small farms sell their products and almost one-quarter of small farms use over 50% of their agricultural products to satisfy their own needs [22]. In Romania, small farms produce an estimated 25–30% of the nation's food products while they constitute 95% of all farms [23]. In Moldova in 2017, small farms produced about 56% of the total agricultural production, while they constitute about 98% of all farms [24]. In Serbia in 2012, around 92% of cattle and 80% of pigs were reared in family holdings. In 2012, farms under 10 ha were breeding about 55% of total livestock. In the same year smallholders and family farms accounted for, among others, 40% of the total production of orchards, about 30% of the total pulses and vineyards production and about 25% of the total potato production [25]. According to De Los Rios [26], in almost all Latin American countries, smallholder

farms play a crucial role in national food security by contributing significantly to the production of fruit, vegetables, meat and dairy. In many countries, the share of small farms in the nation's total basic food supply exceeds 60%: in Argentina—goats 82% and pigs 64%; in Bolivia—corn 70% and potatoes and cassava nearly 100%, in Chile—goat herd 94%; in Costa Rica—bananas 74% and corn 97%; in Ecuador: potatoes 64%, corn 85% and sheep herd 83%; in Paraguay—fruit 94%, cassava 94% and swine 80%. The importance of small-scale family farms for the agricultural sector is reflected in many initiatives, including international ones. Suffice it to mention that during the 66th session of the United Nations Assembly, 2014 was named the "International Year of Family Farming" [27]. Numerous studies have examined how family farms function but the vast majority concern emerging countries, mainly in Africa [28–30], Asia [31–33] and Latin America [25,34]. De Los Rios [25] emphasises the economic role of smallholder farms in various Latin American countries. The latter authors [34] presented issues concerning farmland distribution, pointing out that in countries with a large utilised agricultural area in Latin America, there has been a growth in large-scale farming. A global overview of the number, size and distribution of small farms, smallholder farms and family farms, as well some of their roles, was presented by Lowder, Skoet and Raney [9]. Countries with the highest number of small farms are located in Asia, namely China (201 million farms, 35% of all farms in the world), India (138 million, 24%), Indonesia (25 million, 4%), Russian Federation (23 million, 4%) and Bangladesh (15 million, 3%) [9]. Small farms in Latin America differ from the other ones in Asia or Africa, as there are relatively fewer very small farms in Latin countries and the average small farm in these countries is considered large in most countries in sub-Saharan Africa or Asia [9,35]. Research related to developed and highly developed countries is less popular, even though family farms are the basis of agriculture in some of them. There are about 23 million small farms in developed (high-income) countries [9]. This is the case for the economies of Central and Eastern Europe (CEE), where family farms have a greater potential for sustainable development in economic, social and environmental fields and to achieve a balance between these three spheres [8,10]. However, new information is needed about the holistic system of market and institutional factors and about the agricultural policy tools that determine this positive process.

The aim of the study was to identify, for selected countries of Central and Eastern Europe, the microeconomic factors (variables describing a farm), institutional factors (in terms of farm integration with the market) and factors related to agricultural policy (share of income support) that affect the resilience of small-scale family farms (if the wording small, small-scale or family farm appears separately later in our analysis, it is about small-scale family farms). These factors were used in a multiple regression model to verify the strength, direction and significance of their impacts. This approach, which involves combining factors from three different areas noted above, is rare in the literature and it constitutes an added value of the article. Including small-scale farming in the analysis is justified because the paradigm of sustainable development that covers the issue of small farms' resilience is becoming important in agricultural economics. We are aware of the importance of environmental issues for shaping the development of the agricultural sector, but we focus on economic and social issues, which were discussed in earlier research to a lesser extent than environmental problems. Moreover, socio-economic issues (concerning low agricultural incomes, poverty risk, very low market power, weak market integration, education and health quality and cultural issues) are among the most important problems for small farms [36–39], besides environmental issues. Thus, improvement in this field seems to be crucial. At the same time, due to the fact that the environmental element is not included in our analysis, we suggest using the term "resilience", which may fit better in with the context of the publication. "Resilience" refers to a farm's "ability to persist over the long-term through buffering shocks and adapting to change" [40]. Achieving a balance in terms of financial and social situations brings the farm closer to this goal.

The scope of the analysis covered Lithuania, Moldova, Poland, Romania and Serbia. All these countries underwent changes based on political transitions, and today, they have similar fragmented agrarian structures. However, these countries obviously differ when taking into account different

issues such as the reforms and processes of transition to the market economy, scale of economy and current economic condition. A detailed description of the transition of Central and Eastern European countries to the market economy, as well as the agricultural transition, was presented, among others, by Marcours and Swinnen [41] (impact of different factors, including policy reforms on agricultural output in CEE countries since 1989), Marcours and Swinnen [42] (agricultural transition in transition economies, including CEE countries and an analysis of causes of the differences between various transition countries worldwide) and Martín-Retortillo and Pinilla [43] (the determination of principal causes of the dynamic agricultural growth in Europe in the period 1950–2005, with an identification of the impact of increases in inputs or in the total factor productivity on agricultural growth, and distinguishing three different models of the development of agriculture).

At the same time, Lithuania, Poland and Romania are members of the European Union; therefore, they are beneficiaries of the support system under the Common Agricultural Policy (CAP). Hence, a comparative analysis of the impact of the level of support, in relation to the agricultural income, on resilience is valuable. There is a fundamental difference between member states of the European Union (Lithuania, Poland and Romania) and Serbia and Moldova when taking into account access to budgetary public support and different instruments (direct payments and the rural development program). The Common Agricultural Policy is one of the biggest EU policies, where member states could receive huge amounts of money during two budgetary periods 2007–2013 (total expenditure in the field of "preservation and management of natural resources") and 2014–2019 (almost full period without 2020, total expenditure in the field of "sustainable growth: natural resources"). The support was, respectively, as follows: (1) cumulative support for agriculture in 2007–2019; (2) support as a percentage of the gross national income (GNI) (average 2007–2019); (3) cumulative support for one farm, taking into account the number of farms in 2017 or 2016 (own calculation based on [44]):

- in Lithuania: (1) EUR 7.43 billion, (2) 1.32%, (3) EUR 49,400.
- in Poland: (1) EUR 54.69 billion; (2) 0.78%; (3) EUR 38,900.
- in Romania: (1) EUR 26.9 billion; (2) 0.9%; (3) EUR 7860.

In Moldova, the support policy is carried out through both public institutions and international donors. The main goal is to strengthen the agricultural sector. Currently, the support is provided by the Agency of Interventions and Payments in Agriculture (AIPA). Among the most important initiatives in recent years were the stimulation of investments in agricultural machinery (MDL 166.5 million, which is about EUR 8.2 million), the development of post-harvest processing and processing infrastructure (MDL 158.3 million, nearly EUR 7.8 million) and the purchase of equipment (MDL 50 million, i.e., EUR 2.5 million). There are some special programs for small farms. They may apply for funds (mainly financed by international donors) for improving the resistance of farms to drought through a better water management and modern irrigation technologies project, strengthening the capacity in national berry production and empowering small and family farms to improve their livelihoods [24].

Serbian agriculture is supported by the government by direct payments, rural development instruments, special initiatives, loans and outstanding obligations, among others. During the period 2013–2019, the expenditure for these initiatives exceeded RSD 178 billion, which is about EUR 1.5 billion, when taking into account the exchange rate in November 2020 [45]. It is about RSD 314 (EUR 2675) per farm during this period. The reforms of agriculture in Serbia (as well other candidate countries, namely, Albania, Montenegro, North Macedonia and Turkey) may be supported by instruments for pre-accession assistance for rural development (IPARD). The aim is to make the agriculture and rural areas more sustainable and align them with the EU's Common Agricultural Policy. The planned budget for Serbia for 2014–2020 was EUR 175 million [46].

The analysis for this study was based on own surveys conducted in Poland in 2018 and in 2019 in the other countries. The samples numbered 710 farms in Poland, 1000 in Lithuania, 900 in Romania and 550 each in Serbia and Moldova. Data were collected in the form of direct interviews by agricultural

advisors. Interview questions concerned four areas: general farm features, economic and social sustainability, environmental sustainability and connections with the market.

We enriched the existing literature on the resilience of small-scale farms in European countries, where our contribution is fourfold:

1. As we mentioned earlier, there are about 570 million farms in the world, where most of them are small and 4% only are located in developed countries. Due to this fact, most studies concern small farms in Africa and Asia, while research papers about such entities in Europe are not very popular. Therefore our study, to some extent, seems to close the gap relating to the lack of research on small farms in developed countries.
2. Research papers with comparative studies are rare. There are many articles with an analysis of farm sustainability or farm resilience in one country. One of the few examples of comparative study is the SALSA (Small farms, small food businesses and sustainable food and nutrition security) project with analyses from 30 regions (for more information on the project, see [47]).
3. Using a unique set of variables for the operation of a farm (variables representing microeconomic issues, institutional field and concerning agricultural policy), we prepared a universal model that described small family farms' resilience for several countries of Central and Eastern Europe (Lithuania, Moldova, Poland, Romania and Serbia), which allowed for extending the results of the analysis for various purposes, namely, for scientific reasons and as policy recommendations. We did not intentionally calibrate different models (with different) for every single country, rather we chose a set of variables and tested them in different cases, namely, different countries. Moreover, we developed a resilience index for small family farms in selected CEE countries;
4. We developed a model that was based on microeconomic data collected by ourselves from more than 3500 entities with an unusual spatial scope.

The article is organised as follows: the next part contains an overview of the literature on how small-scale family farms function and how their sustainability and resilience are measured; the third part describes the methodological aspects, i.e., spatial scope of the study, data set and methods; the fourth part presents the results of the research and discussion; the last part contains conclusions and recommendations for agricultural policy and market institutions.

2. Sustainable Development of Family Farms—Literature Review

The first crucial document that made the global society aware of the need to reorganise development such that it became sustainable was the report of the World Commission on Environment and Development by Gro Harlem Brundtland entitled "Our Common Future". In this paper, the sustainable development was defined as "development which may ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs" [48]. However, it is clear, that this problem did not begin in 1987. Many previous economic actions and decisions that have led to dynamic economic growth after the Second World War, both at the national and global levels, as well as some external environmental and social costs, were not internalised. Therefore, the United Nations proposed a new approach to global development, simultaneously respecting economic, environmental and social issues as equally important.

The concept of sustainable development was adopted by the European Union in 1990 and by the United Nations in 1992 at the Second United Nations Conference on the Environment and Development held in Rio de Janeiro [49]. In general, sustainable development means the use and exploitation of today's resources in a manner that guarantees the availability of these resources for future generations [50]. Researchers who investigate issues related to sustainable development in their studies, mostly emphasise three factors: economic (profitable production of goods and services), environmental (caring for the environment and managing natural resources) and social (thriving society and fair distribution of income) [51] (p. 527), [52] (p. 289), [53] (p. 123). These three can be viewed as a set of clear principles for improving resource utilisation, agro-ecosystems, livelihoods,

resilience and governance [54]. Moreover, these three factors are interrelated; therefore, a deeper understanding of sustainability should follow from such a holistic approach [51] (p. 533).

After analysing the general concept of sustainable development, it is clear that an economic, social and environmental balance in agricultural activity cannot be achieved by analysing each aspect separately because these elements are interdependent and represent the whole, that is, the ideal harmony of sustainability. Sustainability as an idea applies to farms worldwide, showing the need for a common understanding of the economic, social and environmental dimensions of sustainability in agriculture [55]. Sustainable farming constitutes one of the key goals of the 2030 Agenda for Sustainable Development [56].

There are many studies about sustainable agriculture and many authors opt for the need to ensure this balance, while at the same time analysing how this goal could be achieved [57–59]. One of the most crucial and controversial questions about agricultural development concerns the role of small farms [60]. The Food and Agriculture Organization (FAO) [61] emphasises the importance of family farming for alleviating hunger and poverty and improving food security and living standards in rural areas while protecting the environment and biodiversity. Therefore, the role of small family economic entities in creating a sustainable model of agriculture is global [27,62]. At the European scale, the best concretisation of this problem is provided by the CEE countries that have fragmented agrarian structures [63]. Studies on the sustainability of agriculture in the CEE countries are numerous and they cover different aspects. Under European Union's Horizon 2020 project "SALSA" ("Small farms, small food businesses and sustainable food and nutrition security" [47]), many different and transdisciplinary issues were investigated concerning small farms in various regions of Europe and Africa, both in developed (for example, France, Italy, Norway and the United Kingdom) and developing or emerging countries (for instance, Poland, Romania, Lithuania and Latvia, as well as Ghana, Kenya and Tunisia). In order to develop and increase the resilience of small farms, as well as contribute to food stability, it is necessary for these farms to diversify their crop production. Moreover, the resilience of small farms may be increased by supporting them through farm advisory providers. For bovine meat producers from Pisa (Italy), the circular economy in the farms is a crucial objective for achieving economic sustainability while respecting human health and the environment [47]. Small farm businesses in European and African regions should be able to demonstrate strong commercial performances in order to strengthen sustainable food and nutrition security [64]. Czekaj et al. [65] discussed various resilience strategies that have been implemented in several regions in Poland and Latvia to face economic, environmental and social problems. Sharma and Shardendu [66] assessed the link between the improvement in agricultural performance and the sustainability levels of rural regions, where they identified a positive relationship between them, similarly to Volkov et al. [67] (p. 2). Špička et al. [52] compared the compatibility of economic and environmental objectives in agricultural holdings in the Czech Republic. They found no synergy between environmental sustainability and economic performance for any of the investigated farm size groups, including small farms. Mohan [68] examined the relationship between risk and standard production in terms of different market conditions. Sidhoum et al. [69] proposed a theoretical framework to assess farm-level sustainability, taking into account the specific conditions of agricultural production. Satola et al. [70] identified the low profitability of production and the shortage of capital as the most frequent difficulties encountered in the process of exiting from farming. Bojnec and Fertő [71] and Guth et al. [57] appraised the impact of CAP subsidies on the stabilisation of farm incomes and their variability and distribution.

Measuring the sustainability of farms is a complicated issue, mostly because of the ambiguity of definitions. Often the term "sustainability" is equated with the term "viability", but they are not the same. Economic sustainability refers to the farmers' household as a whole, rather than to the occupation of farming [72] (p. 290). This means that farms that are not economically viable can be economically sustainable because of off-farm income, for instance [72,73]. Furthermore, the resilience of a family farm in the long-term is closely connected not only to its long-time viability but also

to its economic durability, i.e., the capacity to transfer it to a successor [53] (p. 125), [72] (p. 290). Economic viability, on the other hand, is usually measured by profitability, liquidity, stability and productivity [53] (p. 125), [72] (p. 291). Thus, sustainable development in farming, as a wider concept, should be understood more broadly [52,74]. It means that a sustainable development analysis should consider a wide range of indicators that interconnect different aspects, not only economic ones but social and environmental ones too. Even though many authors have concentrated on some dimensions of sustainable development, with the focus being on the economic pillar [51] (p. 533), [72] (p. 289), it is a common practice in contemporary studies to interconnect different indicators [75–77].

During the last 15–20 years, there has been a proliferation of methods for measuring economic and social sustainability in agriculture based on sets of indicators [53] (p. 123). To assess the economic element, one usually considers variables such as revenue, income or added value and production costs, as well as the indices of efficiency, profitability, liquidity, stability, productivity and investment [78–80]. When measuring the social aspect of sustainability, it is important to consider income or wealth distribution within the agricultural sector (between farms) and between farms and other social groups. The greater the disproportion in this area, the lower the sustainability [16,81,82]. Other elements of social governance include access to the labour market (including unemployment) and working conditions (working time), levels of education and health, demographic changes (e.g., population growth rate and migration rate), public safety, sustainable consumption patterns, quality of life (social inclusion or exclusion) and access to services and infrastructure in the countryside [83–85].

3. Materials and Methods

3.1. Spatial Scope of the Study

Family farming with a small utilised area and a small scale of production constitutes one base of the agricultural sector in most CEE economies, including those under analysis: Lithuania, Moldova, Poland, Romania and Serbia. Historically, they have been subjected to attempts to transform their systems from a socialist economy to a market economy. Within one decade (the 1990s), millions of small farms had to reorganise in a new market reality in which multinational corporations were aggressive in taking control of food supply chains and causing social, environmental and health costs [23,86,87]. Such cases may also be observed in Latin America, where supermarket operators or their agents are becoming increasingly important, capturing the marketing chains [35]. As a result, a dual structure of agriculture has developed, with industrial food companies operating alongside small-scale but multifunctional farms [88]. For the countries in this study, it is important to ensure the continuity of family farming as an element of the resilience of rural areas. Three of the analysed countries (Lithuania, Poland and Romania) belong to the European Union and are beneficiaries of the Common Agricultural Policy of the EU. Hence, it is interesting to compare the influence of this policy on the resilience of farms in each country.

Romania has the largest number of farms among the countries surveyed, followed by Poland (Lithuania, Serbia and Moldova have significantly fewer farms). These two countries have a similar area of agricultural land. Therefore, the average farm in Romania is smaller than in Poland and other countries. However, Lithuania has the fewest farms but their average area is the largest (see Table 1). In all countries, the share of farms below 10 ha accounts for more than half of the farms, while in Romania, it is as much as 94%, 88% for Serbia, and by contrast, 52% in Lithuania. The small area of agricultural holdings results in the low economic strength of an entity. It is not surprising, then, that in four of the countries (data for Moldova were not available), the vast majority of farms belong to the lowest economic classes, based on standard output (SO) of less than EUR 4000 (Table 2). The fragmented structure, which is a common feature of agriculture in CEE countries, results in weak market power for agricultural holdings. According to the data, the concentration of land in Serbia is the lowest, as over 60% of the utilised agricultural area (UAA) is owned by small farms. In Lithuania and Moldova, this indicator amounts to several percent.

Table 1. Number of farms and the utilised agricultural area (UAA) in the analysed countries.

Specification	Poland	Lithuania	Romania	Serbia	Moldova
Total number of farms (thousands)	1406.0	150.3	3422.9	569.3	369.7
Farms smaller than 10 ha of UAA	1050.0 (75%)	78.8 (52%)	3225.0 (94%)	501.0 (88%)	239.0 (65%)
Average farm size (ha of UAA)	10.5	19.6	3.9	6.1	6.8
Total utilised agricultural area (thousand hectares)	14,539.6	2947.2	13,413.7	3486.9	2496.6
Agricultural land (thousand hectares) in farms smaller than 10 ha UAA	4057 (28%)	430.0 (15%)	4642 (35%)	2162 (62%)	323.0 (13%)

Data for: Poland and Moldova—2017, Lithuania and Romania—2016, Serbia—2018. Source: own study based on [54,89–92].

Table 2. The number of farms by the economic size (measured by standard output) in the analysed countries.

Economic Size	Number of Farms (Thousands) and Their Share in the Total Number of Farms				
	Poland	Lithuania	Romania	Serbia	Moldova
Below EUR 4000 of SO *	661 (47%)	75 (50%)	3200 (94%)	289 (51%)	Data not available
EUR 4000–15,000 of SO	437 (31%)	52 (35%)	115 (3%)	213 (37%)	
above EUR 15,000 of SO	308 (22%)	23 (15%)	108 (3%)	67 (12%)	

Data for: Poland and Moldova—2017, Lithuania and Romania—2016, Serbia—2018. * SO—standard output, which is the average five-year production of the crops or animals expressed in thousands of euro per one year in the region's average production conditions. Source: own study based on [89–91].

Although small-scale family farms dominate the structure of farms in all the surveyed countries, their share in the global production of agriculture is not as high. In Romania, this figure is 25–30% [23], in Lithuania 26% [93] and in Poland, it is below 25% [94]. Data for Serbia and Moldova are missing, but it can be assumed that in these countries, this share will be similar to Romania due to the similar agrarian structure. Globally, small- and medium-sized farms produce between 30% [94] and even 80% of the world's food [95]. However, apart from the share, the contexts of the quality of the food supplied and the consumer's expectations are important, i.e., the choice between highly processed food from large-scale farming and traditional food from small family farms.

When analysing the structure of crops, cereals have a key role in all the countries in the study. Their share ranges from 39% of the total UAA in Romania and Moldova to 54% in Poland (Table 3). Among other crops, the relatively high share of permanent grassland in Romania and permanent crops and fruits in Serbia and Moldova are noticeable. They result from the specificity of agriculture in each country (e.g., grazing animals in Romania and wine growing in Moldova). As for animal production (Table 4), there are some differences between countries. Among the four most popular types of meat, pork accounts for the largest part in Poland and Moldova, and in Romania, the share of pork is equal to that of poultry. The production of poultry meat dominates in Lithuania. Cattle meat is in third place in all countries, while in Lithuania, Poland and Serbia, its production accounts for over 10%; in Moldova and Romania, it accounts for a few percent. In the latter two countries, the share of sheep meat, fourth in order, is relatively large.

Table 3. The structure of agricultural land cultivation in the analysed countries (area in thousands of hectares, share in percent; data for 2018).

Specification	Poland		Lithuania		Romania		Serbia		Moldova	
	Area	Share	Area	Share	Area	Share	Area	Share	Area	Share
Utilised agricultural area	14,540	100	2947	100	13,414	100	3487	100	2497	100
Arable land	11,009	75.7	2113	71.7	8686	64.8	2583	74.1	1832	73.4
Permanent grassland	3150	21.7	795	27.0	4288	32.0	676	19.4	340	13.6
Permanent crops	353	2.4	31	1.1	341	2.5	205	5.9	209	8.4
Kitchen garden	28	0.2	8	0.3	99	0.7	22	0.6	115	4.6
Cereals	7806	53.7	1257	42.7	5261	39.2	1713	49.1	974	39.0
Fresh vegetables	190	1.3	11	0.4	140	1.0	56	1.6	53	2.1
Fruits, berries and nuts	329	2.3	22	0.7	138	1.0	178	5.1	140	5.6

Source: own study based on [18,91,92].

Table 4. Animal production (1000s of tons, share in percent) by meat categories in the analysed countries (data for 2018).

Specification	Poland		Lithuania		Romania		Serbia		Moldova	
	Prod.	Share	Prod.	Share	Prod.	Share	Prod.	Share	Prod.	Share
Cattle	595	14.1	42	17.2	99	8.7	71	13.9	8	6.7
Pig	2136	50.8	72	29.8	481	42.5	313	61.3	66	54.5
Chicken	1474	35.0	127	52.4	480	42.4	96	18.7	45	37.4
Sheep	1	0.0	1	0.5	72	6.4	31	6.1	2	1.5

Source: own study based on [96].

To find the specific production structure for small family farms, it is worth comparing the above information with the survey data. The presented structure of crops and meat production for farms differs in general from such a structure for the analysed small-scale family farms. First, in the second case, the share of cereals in the crops is lower. These figures are as follows: Poland 43%, Lithuania 39%, Romania 27%, Serbia 34% and Moldova 18%. Second, the share of vegetables, fruits, berries and nuts is higher and amounts to 4.5% in Poland, 5% in Lithuania, 6% in Romania, 14% in Serbia and 14% in Moldova. Moldova has a particularly high percentage of these crops. If the vineyards were also included, the figure would rise to 45%. These data suggest that extensive crops, such as cereals, are more typical of larger farms, while smaller farms have a higher proportion, in comparison to larger units, of labour-intensive crops. In turn, in the case of livestock production, a relatively high share of sheep meat is visible, especially in Romania with 36%; in Moldova, this value is 14%, and in Serbia and Lithuania, it is about 9% (in Poland, this kind of meat is not popular). Of the other three types of meat, pigs and poultry are the most common (in different ratios for different countries). It is also worth adding that the production structure of the surveyed households is more diversified, which is understandable taking into account the fact that small-scale farms produce not only for sale but also for self-consumption, which is typical and proved in the literature [29,97,98]. Diversification is also a way to reduce the production risk in the conditions of the functioning of the market mechanism. Due to the lack of capital, it is more difficult for small farms to react to fluctuations than for stronger entities.

3.2. Data Set

There is no general definition of a small-scale family farm. The most common small farms are defined according to criteria such as structural size (e.g., farmland area, number of animals and size of the labour force), economic size (standard output, gross cash farm income or farm revenue, annual sales or turnover, etc.) and market participation (e.g., purchased inputs and foodstuff sales) [99,100]. In this context, very small farms could be defined as those with an agricultural area of less than 2 ha or 5 ha [9], while small farms are those with an area of up to 20 ha [101]. Żmija et al. [102] even indicate 30 ha as the upper ceiling for small farms, but such a threshold in the analysed countries would be too high. In turn, by including an economic strength (SO) classification, Eurostat and Farm Accountancy Data Network (FADN) [103] employed a methodology in which the upper limit for small farms was

EUR 25 thousand. Finally, for this research, the following criteria were adopted concerning the utilised agricultural area (ha) and standard output (thousand EUR) [88]:

- Poland: up to 20 ha and EUR 25,000
- Lithuania: up to 20 ha and EUR 25,000
- Romania: up to 20 ha and EUR 15,000
- Serbia: up to 20 ha and EUR 15,000
- Moldova: up to 20 ha (it was not possible to define the SO criterion due to a lack of data).

The lower limit (15,000 instead of 25,000) for Romania and Serbia results from the greater fragmentation of the agrarian structure in these countries and was accepted after a suggestion from foreign partners.

These criteria of small (small-scale) farms are most often met by family farms, although this is a very heterogeneous group. Family farms, apart from owning agricultural land and running agricultural activity, are characterised by agricultural work using the labor force from the farm (family members). The bottom line is that family work should prevail regarding overall labour inputs [104]. Therefore, we adopted an additional criterion of at least 75% of the labour input coming from family members, which is the criterion of a family farm. Thus, we excluded from the analysis those individuals who, although they own agricultural land, actually work outside agriculture.

The analysis was based on surveys conducted in Poland in 2018 and in 2019 in the other countries. The samples numbered 710 farms in Poland, 1000 in Lithuania, 900 in Romania and 550 each in Serbia and Moldova. A purposeful and random selection of the research sample was used. In the first stage, small family farms were selected, taking into account the abovementioned criteria. In the second stage, employees of agricultural advisory centres or agencies cooperating with farmers randomly selected units from among those farms included in the database. The representativeness of the sample was maintained by evenly dividing the population by regions/sub-regions, types of production, land area and production scale (in terms of criteria). Data were collected in the form of direct interviews by agricultural advisors. Interview questions concerned four areas: general farm features, economic and social sustainability, environmental sustainability and connections with the market. Pilot studies were carried out in Poland before the main study to avoid misunderstanding during the actual survey. Finally, after eliminating questionnaires that were incomplete, incorrectly completed or that contained outliers, the following numbers of farms were analysed: 672 farms in Poland, 999 in Lithuania, 809 in Romania, 527 in Serbia and 525 in Moldova.

3.3. Methods

The research process was carried out in two stages. In the first stage, a synthetic measure of a farm's resilience as a combination of two components, namely, economic and social, was developed. The economic element took into account the amount of disposable income of a farm relative to the average wage in the country (the so-called income gap ratio), a subjective assessment of the material situation of a household (on a scale of improvement from 1 to 5), a subjective assessment of investment capacity (on a scale of improvement from 1 to 4) and the estimated value of an agricultural holding (land and capital). Income and material situation as variables of economic condition are often used in similar studies. This approach was used by Noga [105] to estimate the model's economic welfare index. On the other hand, Latruffe [80] chose income, revenue, production costs and financial indicators as economic variables. In this assessment, it is also important to have appropriate financial reserves that determine the development (investment) capacity of a farm.

The variables shaping the social element of the resilience included household equipment (e.g., access to running water, a sewage system, central heating, access to the Internet and satellite TV and a car), usable floor space (m^2/person), the participation of the farm manager and/or adult members of the family in lifelong learning systems, participation of the farm manager and/or adult family members in cultural and entertainment events and workload index (number of hours worked

per week by a full-time employee on the farm). These elements determine the quality of life of farm members. For example, housing conditions, educational status and working time are identified as key factors for assessing human needs [84,106,107]. Holly and Mohnen [108] and Živčicová, Bulková and Masárová [109] showed that a good balance between working time and non-work life results in achieving life satisfaction. Attention is also paid to cultural elements, traditions and ethical values as being significant for this assessment [84,85]. Moreover, the involvement of farmers in the local community is considered to be an important factor for the social dimension in rural areas. However, data on this subject are not collected or are incomplete, which also justifies including this variable in determining the synthetic social measure [110]. Table 5 presents the results of the synthetic socio-economic resilience index.

Table 5. Elements of a synthetic measure of the socio-economic resilience of farms.

Economic Variables	Social Variables
• Income gap ratio • Subjective assessment of the material situation of a household • Subjective assessment of the investment capacity • Estimated value of an agricultural holding	• Household equipment • Usable floor space • Participation of the farm manager and/or adult members of the family in lifelong learning systems • Participation of the farm manager and/or adult family members in cultural and entertainment events • Workload index

Source: own development based on the survey data and expert consultation.

The economic and social variables used in this study were subjected to zero unitarisation and the de-stimulant (income gap ratio) was converted into a stimulant. Unitarisation was performed according to the following formulas:

$$\text{stimulants} : z_{ij} = \frac{x_{ij} - min_i\{x_{ij}\}}{max_i\{x_{ij}\} - min_i\{x_{ij}\}}, \ (i = 1, 2, \ldots, n; j = 1, 2, \ldots, m); \ z \in [0,1], \tag{1}$$

$$\text{destimulants} : z_{ij} = \frac{max_i\{x_{ij}\} - x_{ij}}{max_i\{x_{ij}\} - min_i\{x_{ij}\}}, \ (i = 1, 2, \ldots, n; j = 1, 2, \ldots, m); \ z \in [0,1], \tag{2}$$

where $min_i\{x_{ij}\}$ is the minimum value of feature j, $max_i\{x_{ik}\}$ is the maximum value of feature j and i is the object (in this case, the country).

Next, the weights for particular coefficients were determined using the importance criteria through the intercriteria correlation (CRITIC) method. In this method, weight coefficients are determined on the basis of standard deviations and correlations between the coefficients. A distinctive feature of this method is the assigning of higher weights to features that have high rates of variability, along with a low correlation with other features. The weight coefficients were determined according to the following formula:

$$w_j = \frac{c_j}{\sum_{k=1}^{m} c_k}, \ j = 1, 2, \ldots, m; \ c_j = s_{j(z)} \sum_{k=1}^{m} (1 - r_{ij}), \ j = 1, 2, \ldots, m, \tag{3}$$

where c_j is the measure of the informational capacity of feature j, $s_{j(z)}$ is the standard deviation calculated from the standardised values of feature j and r_{ij} is the correlation coefficient between features j and k. The sum of the coefficients is 1. Then, the multiplication of the determined standardised values of simple features by relevant weight coefficients was performed.

In the next stage, the respective Euclidean distances of units from the pattern and anti-pattern of development were calculated according to the following formulas:

$$d_i^+ = \sqrt{\sum_{j=1}^{k}(z_{ij}^* - z_{ij}^+)^2}, \quad (4)$$

$$d_i^- = \sqrt{\sum_{j=1}^{k}(z_{ij}^* - z_{ij}^-)^2}, \quad (5)$$

where:

$$z_j^+ = \left(max\left(z_{i1}^*\right), max\left(z_{i2}^*\right), \ldots, max\left(z_{ik}^*\right)\right) = \left(z_1^+, z_2^+, \ldots, z_k^+\right),$$

$$z_j^- = \left(min\left(z_{i1}^*\right), min\left(z_{i2}^*\right), \ldots, min\left(z_{ik}^*\right)\right) = \left(z_1^-, z_2^-, \ldots, z_k^-\right).$$

The value of synthetic feature q_1 was determined according to the following formula:

$$q_i = \frac{d_i^-}{d_i^+ + d_i^-}, \ (i = 1, 2, \ldots, n). \quad (6)$$

The indexes ranged from 0 to 1. The higher the value of the index, the higher the socio-economic resilience of a farm. The detailed values are given in Table 6.

Table 6. Results for the synthetic resilience index for the analysed countries (where values for the resilience index can range from 0 to 1).

Specification	Poland	Lithuania	Romania	Serbia	Moldova
Average value	0.508	0.476	0.518	0.529	0.416
Max value	0.853	0.670	0.938	0.873	0.717
Min value	0.281	0.247	0.157	0.151	0.110
Standard deviation	0.093	0.083	0.134	0.132	0.111

Source: own calculations based on the survey data.

To show the impact of the independent observed variables on the socio-economic resilience index of small farms, we used multiple regression analysis. The model formula for each country was as follows:

$$\ln(Y) = \beta 0 + \beta 1 \ln(X1) + \beta 2 \ln(X2) + \beta 3\ X3 + \beta 4 \ln(X4) + \beta 5 \ln(X5) + \beta 6\ X6 + \beta 7\ X7 + \varepsilon, \quad (7)$$

where:

Y— resilience index of small farms.

$X1$—index of farm integration with the market. The synthetic index comprised the following elements: (1) share of the farm's market sales, (2) distribution channels for agricultural products, (3) type of relationship with the market when selling agricultural products, (4) subjective assessment of a farm's market position (bargaining power) in sales transactions, (5) type of relationship with the market when purchasing the means of production and (6) subjective assessment of a farm's market position in purchase transactions. It was assumed that the farm is more integrated with the market when the share of the market sale (element 1) is higher; the supply chain of agricultural products (element 2) is shorter, formal and long-term contracts are used in sale or purchase transactions; the farm also belongs to a producer group or a cooperative (elements 3 and 5); market position (elements 4 and 6) is assessed favorably for the farm. Each of the elements

was scored from 0 to 1; therefore, the total index was scored from 0 to 6 points. Finally, the index was scaled from 0 to 1.

*X*2—value of the agricultural output (in the national currency).

*X*3—education of the farm manager (broken down into: (1) no or primary, (2) secondary, (3) vocational and (4) higher.

*X*4—age of the farm manager.

*X*5—utilised agricultural area of the farm (in ha).

*X*6—main production type (broken down into (1) crops, (2) animal and (3) mixed farms). The main type of production means that more than two-thirds of the value of global production comes from a given type of activity (crops or animals). Otherwise, there is a mixed type of production.

*X*7—for Poland, Lithuania, Romania—share of subsidies in the farm income (broken down into: (1) below 50% and (2) over 50%).

*X*7—for Serbia and Moldova—Does the farm receive public support? ((1) no or (2) yes). Such a distinction comes from the fact that neither Moldova nor Serbia is covered by CAP instruments and the share of support in these countries is much lower.

Continuous variables (dependent: *Y* and independent: *X*1, *X*2, *X*4 and *X*5) were used in the model as natural logarithms, education (*X*3) was an ordinal variable (values from 1 to 4, as mentioned above), while the other two variables (*X*6 and *X*7) were dummy variables. Descriptive statistics are given in the Tables A1 and A2 in the Appendix A. It was assumed that the improvement of socio-economic resilience is fostered by

- an increase in the value of the index of farm integration with the market (*X1*). That is, the better the farm is integrated with the market, the better and more stable the socio-economic situation of the farm.
- an increase in the value of agricultural production (*X*2). Higher agricultural income, and thus the disposable income in a farmer's household, indirectly influences the social situation. Income is a variable that determines the amount of household equipment, the area of a house/flat, participation in cultural events and participation in lifelong learning systems. These values were the basis for estimating the synthetic measure of social resilience. Hence, assumptions were made about linking production through income with the social element.
- an increase in the level of education *(X*3). This assumed that a better-educated head of the farm manages the farm better, which results in higher socio-economic resilience.
- the higher age of the farm manager (*X*4). This is a better proxy for the experience gained by leading the farm.
- an increase in the utilised agricultural area in the farm (*X*5). This allows for achieving economies of scale.
- mixed type of production (*X*6). For small-scale farms, this means income diversification, which stabilises the economic situation. For large-scale farms, the positive effects of specialisation are emphasised.
- concerning *X*7 for Poland, Lithuania and Romania, this means a higher share of subsidies in the farm income. For Serbia and Moldova, receiving public support increases the income for the farm and the household, which are elements of socio-economic resilience.

For the explanatory variables, we checked the multicollinearity using the variance inflation factor (VIF). This problem did not occur since the VIF in no case exceeded the value of 5 (it reached 2.32 at the maximum), with average values in the range 1.22–1.5 depending on the country. Because of the problem of heteroscedasticity of the random component, robust standard errors were used in the models, thanks to which, the estimates were not susceptible to outliers. All detailed results are presented in Appendix A (Tables A3–A7), while Table 7 shows the results for all the countries in one table to facilitate comparison. Table 7 also includes the R^2 values and the values of the information criteria,

namely, Akaike's information criterion (AIC) and Bayesian information criterion (BIC), regarding the quality of the estimated models, as well as the skewness and kurtosis of the residuals. The authors are aware of the problem of endogeneity that quite commonly occurs in economic models, but for our models, this issue did not seem to be very important. The dependent variable was the small family farms' resilience, which is the authors' own index (in the range from 0 to 1). The process of selecting variables to build a resilience index and for the regression analysis was carried out in two stages. In the first stage, a selection was based both on the earlier work of co-authors [111–113] and a literature review (apart from those mentioned earlier, [114–117]). Then, using the brainstorming method, the list of criteria and alternatives was determined. The authors, academic staff and invited experts in the field of agricultural economics took part in the brainstorming session. The final choice was limited by the availability of data from a survey.

Table 7. Results of multiple regression analysis with robust standard errors: determinants of the resilience of small family farms in the analysed countries.

Specification	Regression Coefficient (Robust Standard Error)				
	Poland	**Lithuania**	**Romania**	**Serbia**	**Moldova**
*X*1: market integration (ln)	0.333 *** (0.042)	0.021 * (0.011)	−0.063 (0.040)	0.184 *** (0.050)	0.115 ** (0.055)
*X*2: agricultural output (ln)	0.055 *** (0.012)	0.036 *** (0.007)	0.024 ** (0.010)	0.101 *** (0.019)	0.047 *** (0.014)
*X*3: education	0.054 *** (0.008)	−0.0002 (0.005)	−0.005 (0.009)	0.046 *** (0.010)	0.016 * (0.009)
*X*4: age (ln)	0.056 ** (0.026)	−0.062 *** (0.019)	−0.059 * (0.033)	−0.006 (0.045)	−0.107 ** (0.042)
*X*5: farm area (ln)	0.023 * (0.014)	−0.022 ** (0.008)	0.006 (0.009)	−0.055 *** (0.013)	0.036 * (0.019)
*X*6: production type—crops	−0.016 (0.014)	−0.079 *** (0.013)	−0.166 *** (0.019)	−0.005 (0.025)	−0.019 (0.055)
*X*6: production type—animal	−0.041 ** (0.017)	0.045 *** (0.015)	0.065 ** (0.030)	0.075 (0.045)	−0.040 (0.075)
*X*7: below 50% share of subsidies in the farm income	0.043 * (0.022)	0.012 (0.012)	0.098 *** (0.020)	not applicable	not applicable
*X*7: no public support	not applicable	not applicable	not applicable	0.005 (0.024)	−0.103 *** (0.026)
_constant	−2.491 *** (0.187)	−0.727 *** (0.118)	−0.717 *** (0.190)	−1.948 *** (0.327)	−1.006 *** (0.250)
Number of observations	672	999	809	527	525
R^2	0.249	0.121	0.243	0.228	0.161
AIC	−542.093	−659.837	−96.470	−3.550	154.922
BIC	−501.500	−615.676	−54.208	34.855	193.293
Skewness	−0.127	−0.584	−0.049	−0.634	−0.715
Kurtosis	2.504	3.186	3.666	4.384	3.413

Source: own calculations based on survey data. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. AIC—Akaike information criterion, BIC—Bayesian information criterion. In the columns, the regression coefficients are given with the robust standard errors in parenthesis. For the variable production type (*X*6) the reference is mixed production; for the public support (*X*7) for Poland, Lithuania and Romania, the reference is a share over 50%, while for Serbia and Moldova, the reference is receiving public support from the budget. Detailed results of regression analysis for each country are given in Appendix A, Tables A3–A7.

4. Results and Discussion

Table 7 presents the results of the regression analysis for the model described in Section 3. This model was characterised by coefficients of determination (R^2) in the following amounts: Poland 0.2493, Lithuania 0.1207, Romania 0.2431, Serbia 0.2283 and Moldova 0.1610. These results may be considered acceptable in models based on non-aggregated studies, i.e., microeconomic surveys of farms. However, the models for Lithuania and Moldova explained the variability of the resilience

of farms in a slightly worse way. Nevertheless, according to Cohen [118], Falk and Miller [119] and Moksony [120], it should be emphasised that a low value of R^2 does not have to mean a low influence of the examined factors on the dependent variable.

The results of the model show that resilience was significantly influenced by market integration. This relationship was confirmed in all countries except Romania. Romania's deviation can be explained by the fact that it had the most fragmented agrarian structure among the analysed economies (see Table 1). Agricultural production is dominated by peasant farms with a small agricultural area and usually 1 or 2 animals [121,122]. Such entities allocate a significant part of their production (food) for their own needs [3]; hence, their integration with the market is weaker. In addition, they experience difficulties using formal distribution channels, which is the reason informal sales are maintained [123]. In other countries, there is a significant causal relationship between integration and resilience. Under market conditions, small agricultural producers have limited possibilities to influence the transaction process, including setting prices, which ultimately shapes their income [124,125]. Through a coordinated system of integration, their position in the supply chain improves, which is reflected in higher margins of the farm [126,127]. Business risk is also reduced, and economic efficiency, labour and capital productivity are increased [128–131].

The volume of agricultural output for each country showed a significant positive impact on their resilience, which is in line with the authors' earlier predictions. It can be expected that higher production increases the income of small-scale farms, as they are in the stage of increasing economies of scale. The effect of a higher scale of production is lower fixed unit costs, lower labour intensity and higher bargaining power in the supply chain [132]. Such conclusions were obtained from the analyses of European countries, e.g., Poland [133,134] and Romania [135]. Similar results also apply to the countries of the Middle East [136] and Africa [137,138]. Żmija and Żmija [139]) also emphasised that an increase in the scale of production, combined with better integration with the market (growing share of output destined to the market), strengthened farms economically. Therefore, it can be concluded that this factor is universal.

For human capital, there were two variables in our model, which were the education and age of the farm manager. The latter of these is often closely connected with professional experience related to working in agriculture. The education of a farm manager significantly affects the resilience of small family farms in Poland and Serbia. It also affects farms in Moldova at a significance level of $\alpha = 0.1$. There was no significant impact of education on resilience in Lithuania and Romania (p-values exceeded 0.97 and 0.57). Education is a crucial element of rural development and is a driving force for economic growth. Moreover, it contributes to job creation through the better use of agricultural and non-agricultural potential. Many studies have emphasised that education has a positive impact on the economic condition of a farm, which in turn determines the farm's socio-economic sustainability index (e.g., [98,140–142]). Small-scale farms usually avoid risk and they function better when they are integrated with the market. They are most often managed by (more) educated heads of the farms, who are willing to use advisory services [143] (pp. 88–102), [144]. Education has a positive impact on the subjective norms of the farmers in Serbia. This can be associated with the socio-economic features of farmers. Education was not statistically significant for farmers' attitudes and perceived behavioural control in Serbia. In comparison, education played a significant role for farmers in Bosnia and Herzegovina [145]. In farms in Iran, an increase in a farmer's education and technical knowledge positively contributed to improving their farm's sustainability [136]. Increasing the level of education resulted in raising agricultural sustainability in Malaysia as well [146]. However, Bonfiglio et al. [147] showed that the level of education is not important for explaining the eco-efficiency of farms. Micha et al. [148] claimed that education levels are not associated with the farmers' participation in subsidy schemes, but they do suggest that better-educated farmers have a better understanding of the application procedures and difficulties connected with the use of support schemes.

For our regression analysis, age was included in a logarithmic form. We assumed that the experience and competencies necessary to manage a farm grow with the increase of age, but the

marginal increments are smaller with increasing age (in contrast to the linear form). The age of the producer is usually associated with risk aversion and more diversified production. Together, they contribute to higher food security, and they may also stabilise agricultural income, which is an element of socio-economic sustainability [149–151]. For Gadanakis et al. [142], the relationship between a farmer's age and the farm's eco-performance was positive. This was explained by the greater experience of the manager. Our research confirmed that a farmer's age was conducive to achieving higher resilience in Poland (positive and statistically significant impact). Otherwise, age negatively affected resilience at a significance level $\alpha = 0.01$ in Lithuania, $\alpha = 0.05$ in Moldova and $\alpha = 0.1$ in Romania. Some studies showed an indistinct influence of the manager's age on technical efficiency. In some studies, contrary to the presented model for Poland, younger farmers had a positive impact on economic and environmental performance [152]. In turn, age has no influence on resilience in Serbian farms. Similar conclusions about the influence of age on various socio-economic features of the farm were presented by Godoy-Duran et al. [98] in the case of calculating eco-efficiency. In the research using structural equation modelling conducted by Stojcheska et al. [145] in Macedonia and Bosnia and Herzegovina, age negatively affected the intention to use rural development support (this was also the case in Serbia), but this variable was not statistically significant. Age had a negative effect in Macedonia and Bosnia and Herzegovina (with $\alpha = 0.1$) on farmers' formation of subjective norms, while it was statistically insignificant for farmers' perceived behavioural control. According to Poczta-Wajda et al. [153] in Poland, managers of small-scale farms who were older (over 40 years old) and better educated (secondary and higher education in comparison to no or primary education) had higher food security in their households, which were functioning parallel to their farms. Grzelak et al. [154] investigated the influence of education and experiences on the approach to the natural environment among farmers in the Wielkopolska region in Poland. They claimed that this approach, which results from social features, such as knowledge of or attitude towards the concept of sustainability, is positively influenced by education, which in this case was at least secondary education of the farm's head. These results confirm the role of education, age and experiences in achieving various socio-economic goals and, in the broader sense, sustainability goals. To summarise, we cannot definitively conclude the effect of age on farm resilience and the final conclusions may differ between countries. Additionally, the farmer's personality traits would have to be considered in order to obtain more detailed results. Unfortunately, we did not have such data.

The farm area variable was significant for all the countries surveyed except Romania, but the direction of the impact was not the same in all the countries. In Poland and Moldova, the signs were positive; in Lithuania and Serbia, negative. In the literature, positive relationships are generally found between the area of the utilised agricultural land and the socio-economic sustainability of farms (e.g., [98,155]). Ren et al. [156] also emphasised that agricultural land area is positively correlated with economic and technical efficiency and labour productivity (economic variables) and with the modernisation of rural areas and the strengthening of food security (social variables). Nevertheless, those authors recognised that the impact of changes in farm size on the overall productivity, total factor productivity (TFP) and allocative efficiency is unclear and requires further investigation. It should also be noted that the conducted analysis concerns a narrow group of small-scale farms. Therefore, the results can be less ambiguous as for the entire population of farms. This may be the reason for the negative sign of the variable for Lithuania and Serbia. Hence, in this case, we cannot identify the reasons for the discrepancy without a detailed analysis of the production structure and the degree of specialisation, which require wider surveys.

As explained above, the production type variable in our study had three dominant variants which distinguished between farms with a predominance of crops, farms with a predominance of animals and farms with both (mixed). The results in Table 7 should be interpreted with reference to the mixed production type for each model. Compared to mixed production, farms that specialised in crops had a negative effect on the resilience of the farm, which confirms our earlier expectations This was true in all the countries, but only in Lithuania and Romania was this variable statistically significant at

$\alpha = 0.01$. On the other hand, compared to mixed production, animal production had a significant negative impact on the resilience of farms in Poland, but it was positive in Lithuania and Romania. The type of production did not have a statistically significant impact on the resilience of farms in Serbia and Moldova.

The importance of the production type for economic and social sustainability was investigated, among others, by Bachev [157]. Negative signs of regression coefficients for crops and animal production against mixed production mean that socio-economic sustainability was favoured by mixed production, which may effectively combine elements of both types. Crop production itself was associated with worse economic results and the lower profitability of farms, while livestock production alone may be associated with higher inputs (including external services and costs of feed) than in the case of integrating crops and animal production.

Czyżewski et al. [158] studied the socio-economic sustainability (using different socio-economic variables and the sustainable value (SV) method) on farms of eight individual production types in EU countries in 2004–2015. Their results showed that in most EU countries (15 out of 24 countries, including Poland and Romania), mixed farms were the most sustainable, while in Lithuania, farms with a mixed type achieved average results compared to all farms in that country. Similar results were obtained by Wigier et al. [159]. According to those authors, mixed farms (different animals) were characterised by higher efficiency and were more market-oriented. Thus, it can be assumed that the mixed type of production, especially in countries with fragmented agriculture (to which all countries studied by us belong), contributes to increasing sustainability and improving global food security, as confirmed by Brodt et al. [160]. These authors pointed out that mixed crop–livestock systems are especially important in developing countries. Other authors observed that agricultural production systems, combining crops and animal production, increase sustainability in the long term because of the availability of raw materials for production and lower susceptibility to price fluctuations [161]. Moreover, the mixed type of production guarantees, to a certain extent, the self-supply of agricultural products, which improves a farm's socio-economic situation. Therefore, it would be reasonable to conclude that crop production can provide fodder for livestock production, while livestock production can supply crop production with natural fertiliser resources. Thus, the integration of these different types of production may help to achieve greater resilience. Such results have been obtained in Poland and, regarding crops, in other countries, although they are ambiguous. A positive sign for Lithuania and Romania may be due to the fact that in the case of animal production, it was highly diversified, where they produce poultry, pigs, cattle and sheep. At the same time, a large part of this production went to self-consumption, which limited the farm expenditure on these products. In contrast, in Poland, there was a large share of pigs whose prices were relatively volatile. In the period in which the research was carried out (second half of 2018), the prices of live pigs were unfavourable, e.g., due to the crisis caused by the african swine fever (ASF) disease. Hence, the economic results of farms that specialised in pig production were weaker.

The support for agricultural income was the last of the analysed variables. Contrary to the authors' expectations, in Poland and Romania, a lower share of income support (below 50%) increased resilience (a positive indicator was recorded for Lithuania and Serbia as well, but in those cases, the variable was not statistically significant). Only Moldova was characterised by a negative sign for this variable. These results are all the more surprising as most of the research in this area confirms the positive impact of subsidies on agricultural income, and thus on resilience. Such conclusions for Poland, among others, were found by Smędzik-Ambroży et al. [162], and for EU countries by Guth et al. [57]. Moreover, it is assumed that the elimination of support could result in negative net incomes for agricultural producers [114]. Furthermore, higher support can ensure employment stability in the agricultural sector and solve the problems of social exclusion and the depopulation of rural areas [163,164]. Yet, in the studies cited above, the results refer to all economic sizes of farms. It should be noted that the largest beneficiaries of subsidies from the EU's agricultural budget are large farms [165]. For small-scale farms, relative support is much lower, and it is often intended for

current consumption. Thus, it has a smaller impact on production and agricultural income. On the other hand, when income depends too much on subsidies, there is a decrease in economic efficiency and productivity [166,167], and wrong decisions are made about allocating resources [168]. This also reduces the farmer's motivation to increase productivity and entrepreneurial behaviour because of the certainty of stable cash inflows in the form of subsidies. Perhaps this is why Baran [133] and Galluzzo [97] showed no correlation between the utilisation of EU budget funds and the pace of improving the efficiency of Polish and Romanian agriculture. Still, other authors show that agricultural support programs can have both positive and negative impacts on resilience, food security and quality of life, depending on this support [162].

In our study, two countries with a positive sign for the support variable, namely, Poland and Romania, belong to the EU and are covered by the instruments of the Common Agricultural Policy, including mainly area payments, which are not related to the size and structure of production. Therefore, a farmer receives support regardless of the achieved production results, which may have a demotivating effect on farming activity. In Moldova, such a phenomenon does not occur because government assistance is associated with activities aimed at increasing productivity. To summarise, subsidies are not a sufficient condition for improving resilience if they are treated only as an income security buffer and if resources are not managed efficiently and rationally.

5. Conclusions and Policy Recommendations

This analysis indicated that the universal variable shaping the resilience of small-scale family farms was the scale of production. In all countries, this factor was statistically significant, and it had a positive effect on the result. To achieve higher benefits, an increase in production should be combined with strengthening the market integration of agricultural producers. Among the demographic variables, the level of education had a significant and positive effect on resilience in three countries: Moldova, Poland and Serbia. The influence of age was ambiguous, as were the variables of the farm area and the type of production (although for specialisation in crop production, the signs for all countries were negative but statistically significant in only two countries). Accounting for this and the fact that higher support does not necessarily ensure socio-economic resilience, agricultural policy cannot be a simple transfer of income. As shown by the experience of the three surveyed EU countries (Poland, Lithuania and Romania), area payment as the main source of support under the CAP goes mostly to large farms [165], and in the case of small farms, they do not increase the efficiency, but rather increase the scope of current consumption [169]. In this case, support should be focused on those goals that improve the economic and social conditions of small-scale family farms in the long term. First, efforts should be made to financially strengthen farms and stimulate their investments. Modernisation and value-adding programs dedicated to small-scale farms should be developed, which should be linked to the availability of external funds (e.g., preferably in the form of subsidies due to the aversion to borrowing). The recommended solutions are those that increase production capacity without the need to enlarge the land area. The price of the latter can be an insurmountable barrier for small farms. These tasks should increase value and improve the farmer's position in the supply chain. The position of the producer in the food supply chain determines the income situation of the farm (economic stability), and it shapes the quality of life of family members (quality of life). In the authors' opinion, the support should be well adjusted, especially in Central and Eastern European countries and other countries with a high share of small farms and fragmented agricultural structure (i.e., Greece, Italy and Portugal), where farms are more greatly depreciated by the market mechanism.

A good example of the indicated direction is the adoption, at the EU level, of six priorities of the Common Agricultural Policy, including, among others, "promoting food chain organization, supporting processing and marketing of agricultural products, animal welfare and risk management in agriculture". These initiatives refer to both horizontal and vertical integration, including support for setting up producer groups and organisations; interbranch organisations; investments in the processing, marketing and development of agricultural products; risk management; direct sale; participation in quality

schemes. Furthermore, after 2020, one of the key objective for CAP is "to rebalance power in the food chain" by strengthening the cooperation between farmers, increasing market transparency, supporting the development of market-driven production models (geographical indications, organic production and local food systems) and fostering research and innovation. Detailed solutions are included in the national rural development programs and financed from the EU and national budgets alongside a contribution of the farm. Similar practices can be adopted in Serbia and Moldova, with the difference that the greater burden of payments will involve the national budget. One problem, however, is the low awareness of the benefits of such cooperation and the low interest in participating in this type of relationship. Hence, the key is to educate farm managers through direct training and courses that present so-called "good practices" and show the financial profits of strengthening market integration. Such programs could be organised by agricultural advisory centres and agricultural unions academic centres, and they could be financed under rural development programs.

Another proposed solution is to introduce greater transparency into the contracts between farmers and recipients of the raw material. It might be a good idea to create a standardised contract template (at the national level) that would include elements that protect both parties in the transaction. To establish fair prices, it is possible to create a national information system (and an EU-wide system for EU members). This may take the form of compulsory reporting on the market situation in each country/region and in each agricultural sector to make it easier to determine the price conditions of contracts. In addition, an accessible internet platform should be built to ensure better communication. It would provide information on prices and food needs and the requirements of consumers. This would allow farms to dedicate their offers of agricultural products. It would also promote short supply chains and direct sales and create infrastructure (e.g., local bazaars) for that type of exchange. On the other hand, it is important to build awareness and attitudes of consumers in terms of the principles of healthy eating through shaping the correct diet, local values, non-industrial food and the importance of supporting local food producers. Such activities can be integrated into the education system at any level, creating educational programs, internet content, billboards and other forms of communication.

Despite the influence of age being ambiguous in our analysis, we see a problem of succession in small farms. The low percentage of young people in these units is unfavourable due to the loss of the potential to create efficient, competitive and innovative farms. However, problems with succession in small-scale agriculture threaten not only competitiveness at the microlevel but also the economic and social viability of entire rural areas [135]. Therefore, actions that encourage young farmers to continue their activity in agriculture are strongly recommended (through preferential financial, technical and organisational support).

However, the design of agricultural and food policy that stimulates small family farms' resilience requires the inclusion of some additional variables covering more economic, social and environmental aspects. This is one of the limitations of our study. Including only selected elements in the research is to some extent subjective and resulted from the questionnaire studies; thus, further investigation could be developed. Another limitation of our study is its static approach, but we are aware of a certain weakness of this approach and the necessity to complete the calculations with a dynamic analysis. Finally, the analysis of "area" was unsatisfactory, as, for example, a small farm with fruits and vegetables needs less area than for cereals. We are aware of this problem, but a more detailed analysis was not possible due to the lack of specific data. Moreover, in some cases, the comparison of data was restricted, as in the case of vineyards, which are quite popular in Moldova, while they almost do not exist in Poland or Lithuania. All these limitations should be considered in the future.

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Appendix A

Table A1. Descriptive statistics of the continuous variables used in the regression analysis in the analysed countries.

Specification		Resilience Index *Y*	Market Integration Measure	Agricultural Output (EUR)	Age	Farm Area (ha)
Poland	Mean	0.508	0.689	12.152	49	11.10
	Median	0.501	0.707	11.834	50	10.95
	Std. dev.	0.093	0.109	6.644	11	6.10
	Min	0.281	0.342	581	22	1.50
	Max	0.853	1.000	25.000	67	20.00
Lithuania	Mean	0.476	0.390	5.499	48	10.47
	Median	0.475	0.400	5.121	49	9.60
	Std. dev.	0.083	0.149	4.438	14	5.92
	Min	0.247	0.042	100	19	1.00
	Max	0.670	0.790	25.000	77	20.00
Romania	Mean	0.518	0.537	9.957	47	8.34
	Median	0.489	0.550	9.455	47	7.00
	Std. dev.	0.134	0.121	7.956	12	9.58
	Min	0.157	0.225	0.1	20	0.01
	Max	0.938	0.887	15.000	81	20.00
Serbia	Mean	0.529	0.465	6.419	55	4.17
	Median	0.528	0.458	6.855	54	4.00
	Std. dev.	0.132	0.118	4.307	131	2.78
	Min	0.151	0.042	680	21	0.00
	Max	0.873	0.775	15.000	95	20.00
Moldova	Mean	0.416	0.476	7.454	46	4.57
	Median	0.429	0.483	7.201	46	4.00
	Std. dev.	0.111	0.126	6.933	14	3.34
	Min	0.110	0.080	0.1	20	0.00
	Max	0.717	0.835	19.400	77	14.00

Source: own calculations based on the survey data.

Table A2. Descriptive statistics of other variables used in the regression analysis in the analysed countries: percentage distribution.

Specification		Poland	Lithuania	Romania	Serbia	Moldova
Education	(1) No or primary	6.0%	0.1%	1.4%	21.5%	0.2%
	(2) Secondary	44.3%	9.0%	59.9%	37.9%	36.0%
	(3) Vocational	38.1%	45.2%	20.5%	36.0%	20.4%
	(4) Higher	11.6%	45.6%	18.1%	4.7%	43.4%

Table A2. *Cont.*

Specification		Poland	Lithuania	Romania	Serbia	Moldova
Production type	Crops	45.5%	44.6%	52.0%	39.6%	84.0%
	Animal	21.0%	16.5%	13.4%	8.4%	9.6%
	Mixed	33.5%	38.8%	34.6%	52.1%	6.4%
Share of subsidies in the farm income	Below 50%	89.7%	39.9%	56.8%	n/a	n/a
	Over 50%	10.3%	60.1%	43.2%	n/a	n/a
Public support	No	n/a	n/a	n/a	61.9%	66.2%
	Yes	n/a	n/a	n/a	38.1%	33.8%

Source: own calculations based on the survey data.

Table A3. Results of the multiple regression analysis with robust standard errors: determinants of the resilience of small family farms in Poland.

Number of observations	672
F(8, 663)	23.87
Prob > F	0.0000
R^2	0.2493

Poland	Coef.	Robust Std. Err.	*t*	*p* > *t*	95% Conf.	Interval
Market integration (ln)	0.3327978	0.0424621	7.84	0.000	0.2494213	0.4161743
Agricultural output (ln)	0.0546929	0.0118804	4.60	0.000	0.0313651	0.0780207
Share of subsidies in the Farm income: below 50%	0.0425316	0.021934	1.94	0.053	−0.0005369	0.0856002
Education	0.0541786	0.0083274	6.51	0.000	0.0378273	0.07053
Age (ln)	0.0557721	0.0263111	2.12	0.034	0.0041089	0.1074353
Farm area (ln)	0.0234143	0.013566	1.73	0.085	−0.0032231	0.0500518
Production type: crops	−0.0163162	0.014485	−1.13	0.260	−0.0447582	.00121257
Production type: animal	−0.0410852	0.0170348	−2.41	0.016	−0.0745338	−0.0076366
_constant	−2.490595	0.1873454	−13.29	0.000	−2.858457	−2.122733

Source: own calculations based on the survey data.

Table A4. Results of the multiple regression analysis with robust standard errors: determinants of the resilience of small family farms in Lithuania.

Number of observations	999
F(8, 990)	16.89
Prob > F	0.0000
R^2	0.1207

Lithuania	Coef.	Robust Std. Err.	*t*	*p* > *t*	95% Conf.	Interval
Market integration (ln)	0.0205494	0.0110621	1.86	0.064	−0.0011585	0.0422573
Agricultural output (ln)	0.0359045	0.0074902	4.79	0.000	0.0212059	0.0506031
Share of subsidies in the Farm income: below 50%	0.0121565	0.0115053	1.06	0.291	−0.0104211	0.0347341
Education	−0.0001788	0.0050237	−0.04	0.972	−0.0100371	0.0096795
Age (ln)	−0.0615832	0.0191608	−3.21	0.001	−0.0991837	−0.0239827
Farm area (ln)	−0.0219063	0.0087397	−2.51	0.012	−0.0390568	−0.0047558
Production type: crops	−0.0794312	0.0132698	−5.99	0.000	−0.1054714	−0.0533911
Production type: animal	0.0445111	0.0147693	3.01	0.003	0.0155283	0.0734939
_constant	−0.7266953	0.1177412	−6.17	0.000	−0.9577463	−0.4956442

Source: own calculations based on the survey data.

Table A5. Results of the multiple regression analysis with robust standard errors: determinants of the resilience of small family farms in Romania.

Number of observations	809
F(8, 800)	37.54
Prob > F	0.0000
R^2	0.2431

Romania	**Coef.**	**Robust Std. Err.**	***t***	***p* > *t***	**95% Conf. Interval**	
Market integration (ln)	−0.0629772	0.039907	−1.58	0.115	−0.141312	0.0153577
Agricultural output (ln)	0.0239874	0.010052	2.39	0.017	0.0042559	0.0437189
Share of subsidies in the Farm income: below 50%	0.0982369	0.020071	4.89	0.000	0.0588389	0.1376349
Education	−0.0051763	0.0091792	−0.56	0.573	−0.0231944	0.0128418
Age (ln)	−0.0594378	0.0325682	−1.83	0.068	−0.1233671	0.0044915
Farm area (ln)	0.005755	0.0085715	0.67	0.502	−0.0110703	0.0225803
Production type: crops	−0.16551	0.0192012	−8.62	0.000	−0.2032008	−0.1278193
Production type: animal	0.0651844	0.0302476	2.16	0.031	0.0058104	0.1245584
_constant	−0.7167017	0.1900061	−3.77	0.000	−1.089671	−0.3437324

Source: own calculations based on the survey data.

Table A6. Results of the multiple regression analysis with robust standard errors: determinants of the resilience of small family farms in Serbia.

Number of observations	527
F(8, 518)	19.23
Prob > F	0.0000
R^2	0.2283

Serbia	**Coef.**	**Robust Std. Err.**	***t***	***p* > *t***	**95% Conf. Interval**	
Market integration (ln)	0.184406	0.0502936	3.67	0.000	0.0856015	0.2832106
Agricultural output (ln)	0.1014813	0.0187213	5.42	0.000	0.0647024	0.1382603
No public support	0.005014	0.0241183	0.21	0.835	−0.0423676	0.0523957
Education	0.0460554	0.0100223	4.60	0.000	0.026366	0.0657447
Age (ln)	−0.0065603	0.0447484	−0.15	0.884	−0.094471	0.0813504
Farm area (ln)	−0.0550633	0.0134469	−4.09	0.000	−0.0814805	−0.0286461
Production type: crops	−0.0053378	0.0252	−0.21	0.832	−0.0548446	0.044169
Production type: animal	0.0745847	0.0453413	1.64	0.101	−0.0144907	0.1636601
_constant	−1.948248	0.3268235	−5.96	0.000	−2.590311	−1.306186

Source: own calculations based on the survey data.

Table A7. Results of the multiple regression analysis with robust standard errors: determinants of the resilience of small family farms in Moldova.

Number of observations	525
F(8, 516)	10.43
Prob > F	0.0000
R^2	0.1610

Moldova	**Coef.**	**Robust Std. Err.**	***t***	***p* > *t***	**95% Conf. Interval**	
Market integration (ln)	0.1154981	0.0549287	2.10	0.036	0.0075867	0.2234094
Agricultural output (ln)	0.0472012	0.014059	3.36	0.001	0.0195813	0.0748211
No public support	−0.1034962	0.0258163	−4.01	0.000	−0.1542141	−0.0527782
Education	0.0159865	0.0087441	1.83	0.068	−0.0011918	0.0331648
Age (ln)	−0.1068584	0.0420901	−2.54	0.011	−0.1895475	−0.0241693
Farm area (ln)	0.035748	0.0190236	1.88	0.061	−0.0016251	0.0731212
Production type: crops	−0.0187961	0.055251	−0.34	0.734	−0.1273407	0.0897485

Table A7. *Cont.*

Number of observations	525					
F(8, 516)	10.43					
Prob > F	0.0000					
R^2	0.1610					
Moldova	**Coef.**	**Robust Std. Err.**	***t***	***p > t***	**95% Conf. Interval**	
Production type: animal	−0.0403525	0.0747467	−0.54	0.590	−0.1871978	0.1064928
_constant	−1.005587	0.2499062	−4.02	0.000	−1.496545	−0.5146281

Source: own calculations based on the survey data.

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