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FARM PROFITABILITY AND AGRITOURISM IN THE EU – DOES SIZE MATTER?

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Abstract

Agritourism is an activity in which the non-traditional roles of the countryside: food production, environmental richness, the beauty of landscapes, cultural heritage and traditional lifestyles, local food and drinks, and many other aspects make rural regions attractive for recreation and leisure, while contributing to income diversification.Thus agritourism is expected to help improve farm performance in terms of incomes, profitability and efficiency. While extensive empirical research has been done about this issue in the USA, relatively few results are known for Europe. The present paper deals with the impacts of agritourism revenues on the farm profitability and farm performance in the 28 countries of the EU (including Britain), from 2004 to 2020, relying on the standard FADN database, applying descriptive statistics, correlations and panel regression. Our findings show, that farm size matters, and although the smallest and the largest farms benefit, it is the medium size farms that gain the most from agritourism. Farms with smaller land areas, and less farm capital tend to be involved more in agritourism than better equipped ones, while the subsidy policy of the EU also enhances agritourism revenues.

Keywords: Agritourism, farm size, gross farm income, labour, assets

INTRODUCTION

Agriculture is one of the major policy areas for the EU. The major roles of agriculture – provide food, provide decent income and livelihood for rural communities, maintain the quality of life, sustain and protect the environment, preserve the associated cultural heritage – explain the strong focus on rural development policy and high levels of subsidies, increasingly decoupled from traditional production.

Agritourism is one area, where the non-traditional roles of the countryside come together: environmental richness, the beauty of landscapes, cultural heritage and traditional lifestyles, local food and drinks, and many other aspects make rural regions attractive for recreation and leisure, while contributing to income diversification. The question is, whether agritourism can successfully contribute to better livelihood, and higher incomes, or better performance of farms - and if yes, where, how and to whom.

The present paper focuses on the impacts of agritourism revenues on the farm profitability and farm performance in the EU-28, from 2004 to 2020, relying on the standard farm data available in the FADN (Farm Accountancy Data Network) public database.

THEORETICAL BACKGROUND

The role of rural areas is basically the production of food and of valuable raw materials, but they are increasingly viewed as a location for leisure and recreation, where the richness of the natural environment with its varied eco-systems, landscapes, and cultural heritage, traditional lifestyle and farming practices coexist. At the same time these areas are, above all, places where people live their lifes, requiring various facilities, endowments, services, part of which are needed not only for inhabitants but for those, who come only for a temporary stay (Pícha & Dvořák, 2009). Rural tourism is an important contributor with multiple benefits for rural spaces to fulfill their multiple roles. Rural tourism revitalises rural areas by attracting people and generating additional incomes besides farming, thus stopping rural depopulation, and providing jobs outside agriculture. At the same time, rural tourism helps to maintain the environmental, natural, cultural-traditional, and historical character of the countryside, adding a sustainable and competitive edge to the tourist market of the European Union (Klufová & Šulista, 2018). Rural tourism is deeply intertwined with farming, which is the traditional basis of rural activity and they can mutually enhance each other's prosperity, while they may also suffer from natural or financial disasters in a similar way (Sharpley & Craven, 2001).

Rural tourism has been analysed from several aspects, focusing on tourist motivation and tourist satisfaction, as well as on service providers, their personal and material endowments, and financial position (see e.g. Klufová & Šulista, 2018; Gajić et al., 2021; Chase et al., 2018; Žibert et al., 2022; Lamie et al., 2021; Stanovčić et al., 2018).

The importance of rural tourism, a.k.a. agritourism, has been acknowledged in the rural development policy of the European Union, and this is represented by the rural development subsidies for agritourism purposes, or related measures (Žibert et al., 2022; Augère- Granier & McEldowney, 2021). This reflects the appreciation of rural tourism as an important contributor for improving rural living conditions and lifestyles, especially in the less favoured areas (LFAs) of the countryside (Arru et al., 2021). However, there are relatively few actual research results to prove the economic benefits of agritourism. Most of the economic impact analyses, or farm business analyses have been done about agritourism in the United States. The reasons for this lack of thorough economic impact analysis are first of all, the lack of a

standard definition of what agritourism really includes, and second, the lack of reliable data (Chase et al., 2018; Lamie et al., 2021).

Farm and ranch stays have been popular in the U.S. and in many European countries. The term "agritourism" is originated from the Italian National Legal Framework for Agritourism passed in 1985, which promoted overnight farms stays, called „agriturismo" as a way for farm diversification in Italy (Chase et al., 2018). Agritourism has been increasingly associated with typical culinary offerings of the countryside, as the examples of protected designation of origin (PDO), protected geographical indication (PGI), and traditional specialities guaranteed (TSG) show in Europe, or California's success in attracting visitors to vineyards in Sonoma and Napa counties (Chase et al., 2018).

In many countries and regions, farm tourism has developed very successfully. In Italy, for example, the number of registered tourist farms in 2015 had increased by 60% compared to the previous decade and in Austria 6% of all farms offer agritourism services. In the Alpine region of Germany 20% of farms are involved in agritourism, and a growing trend of rural tourism accommodation facilities is viewed in Slovenia (Žibert et al., 2022).

In spite of the mentioned difficulties, several research publications have dealt with rural tourism as an example of farm diversification, and attempt to analyse its economic benefits to farms, though with controversial results.

Analysing agritourism farms in the United States, Barbieri and Mshenga (2008) find, that annual income and profitability are positively influenced by larger tangible assets, more employees, longer business experience, and more financial resources - which are usually true for larger farms.

Bagi and Reader (2012) also analysed USA farms, looking at diversification and its impacts on the economic performance, finding that those more involved in farm diversification tend to have significantly different farm characteristics, including net worth, net farm income, farm size, and among them those dealing with agritourism achieve highest farm household net worth, and have typically larger agricultural area.

Khanal and Mishra (2014), still dealing with USA farms in 2008, 2009 and 2010 assess the impacts of agritourism and off-farm work, as two options of diversification strategies, on gross cash farm incomes and farm household incomes, finding that small farms benefit most, if they apply both of these options. Those, however, involved in only agritourism, perform better than those involved only in off-farm work, in many aspects, including gross farm income, debt-to-asset-ratio, government payments, and total value of production, and have typically larger land areas.

Joo et al., (2013), examining farmers' participation in agritourism activities in the USA evaluate its impact on farm household income and return to assets, and find that older, educated, and female operators are more likely to participate in agritourism. However, in contrast to the findings by Khanal and Mishra (2014) they reveal that government subsidies are negatively correlated with agritourism participation. Their results show that small-scale farms being involved in agritourism generated the greatest household incomes and returns to assets, therefore for them agritourism can boost the economic well-being of farm households, although their return is only 0.4% higher than of other farms.

Lucha et al. (2016) did a similar research on Virginia's agritourism industry, finding that greater profitability is associated with greater percentage of income from agritourism. Similar results were established by Schilling et al. (2014) for New Jersey in 2007, revealing that agritourism has statistically positive effects on the net cash income per acre and on farm profitability. The profit impacts were found to be highest for small farms, while positive, but smaller, and statistically not significant impacts were found for large farms.

George et al. (2011) found that in California 75% of farms operate agritourism to enhance farm profitability, though only 21% of them had annual revenues higher than 100 thousand USD. Another research (Wilson et al., 2006) indicate that revenues from farming in this region were only 2% of the nationwide farm revenue level.

Arru et al. (2021) researched the economic performance of agritourism in less favoured areas of Italy, Sardinia. Their results show controversial patterns, and they mention that normative constraints limit agritourism performance, namely, that by regulation, the income generated from, or labour spent on agritourism cannot be higher than those of the main farm activity. However, they find that agritourism increases farm turnover, and on average agritourism can generate 46% of total Gross Farm Revenues in the analysed region, although individual farms vary to a great extent.

Holland et al. (2022) points out, that the lack of resources of small farms cause them to struggle financially, and thus many of them are interested in diversifying their operations, to supersede their financial losses from farming.

However, Hollas et al. (2021) declare that the factors that lead to profitable outcomes from agritourism are still not well understood, but farm size, and years of experience of the host, are probably enhancing its success, and besides financial benefits it has positive social and cultural impacts on the rural community. Kima et al., (2019) found that agritourism experience positively influences food purchase patterns for certain commodities – grain, vegetables, fruit, meat and fish.

Most of these studies refer to relatively short time periods of only a few years, focusing on one country or a particular geographical region. Our paper looks at a 17-year long time span (2004-2020) and 28 countries (the member states of the EU with the UK), using a database derived from an extremely large sample of farms. The same database has been successfully utilised to analyse farm profitability in the EU focusing on sustainability issues (Grzelak, 2022), but not for agritourism. Financial impacts of agritourism in the EU is still a rather underrepresented area, therefore the present study can reveal new features and relationships about it.

DATA AND METHODS

Data

The analysis uses secondary data available from the FADN Public Database (FADN, 2022; EC, 2021), for the time period 2004-2020. The data are available for each year and each member state as mean values for farms belonging to six categories of economic size (see Tab.1). Therefore, we have 17 years of data, for up to 6 size categories, and 28 countries, adding up to 2594 subjects to the analysis (for some countries not all years, or not all size categories are relevant). Variables selected for the analysis are listed in Tab.1.

Table 1. Variables in the analysis

Variable name and SE-code in FADN	Notation in the present analysis	Unit	Explanation
Member State	*ST*	*country*	(AT) Austria; (BE) Belgium; (BG) Bulgaria;(CY) Cyprus; (CZ) Czechia;(DE) Germany; (DK) Denmark; (EE) Estonia; (EL) Greece; (ES) Spain; (FI) Finland; (FR) France; (HR) Croatia; (HU) Hungary; (IE) Ireland; (IT) Italy; (LT) Lithuania;(LU) Luxembourg;(LV) Latvia; (MT) Malta; (NL) Netherlands; (PL) Poland; (PT) Portugal; (RO) Romania; (SE) Sweden; (SI) Slovenia; (SK) Slovakia; (UK) United Kingdom; (E8) EU-28; (E7) EU27 as in 2020
Economic size (SE005)	Size	€ 1000	Economic size of holding expressed in 1000 euro of standard output (on the basis of the Community typology).
Economic size category	SC	codes 1-6	By annual standard output, 1: 2000 - < 8000 EUR; 2: 8000 - < 25000 EUR; 3: 25000 - < 50000 EUR; 4: 50000 - < 100000 EUR; 5: 100000 - < 500000 EUR; 6: >= 500000 EUR, based on the value of Size.
Agritourism (SE725)	ATR	€	Receipts from agritourism includes returns from board and lodging, campsites, cottages, riding facilities, hunting and fishing

Table 1 (continued)

Variable name and SE-code in FADN	Notation in the present analysis	Unit	Explanation
Total labour input (SE010)	LAWU	AWU	Total labour input of holding expressed in annual work units = full-time person equivalents.
Total Utilised Agricultural Area (SE025)	Land	Hectare	Total utilised agricultural area of holding, consisting of land in owner occupation, rented land, land in share-cropping and land temporarily not under cultivation for agricultural reasons or withdrawn from production as part of agricultural policy measures..
Total Output (SE131)	TO	€	Total output =Total value of output of crops and crop products, livestock and livestock products and of other output, including that of other gainful activities (OGA) of the farms.
Gross Farm Income (SE410)	GFI	€	Output - Intermediate consumption + Balance current subsidies & taxes.
Farm Net Value Added (SE415)	FNVA	€	Farm net value added = Remuneration to the fixed factors of production (work, land and capital), whether they be external or family factors.
Farm Net Income (SE420)	FNI	€	Remuneration to fixed factors of production of the family (work, land and capital) and remuneration to the entrepreneur's risks (loss/profit) in the accounting year.
Farm Net Value Added per AWU (SE425)	FNVA_AWU	€/ AWU	Farm Net Value Added per agricultural work unit (AWU).
Family Farm Income per FWU (SE430)	FFI	€/ FWU	Family Farm Income expressed per family labour unit. Takes into account differences in the family labour force to be remunerated per holding.
Total assets closing valuation (SE436)	TA	€	= Fixed assets + current assets. (closing valuation). Only assets in ownership are taken into account. Capital indicators are based on the value of the various assets at closing valuation.
Net Worth (SE501)	NWT	€	Total assets – Liabilities.
Average farm capital (SE510)	FCap	€	Average value (= [opening + closing] / 2) of farm capital except land and quotas = Livestock + Permanent crops + Land improvements + Buildings + Machinery and equipment + Circulating capital.
Total subsidies - excluding on investments (SE605)	TSU	€	Total subsidies - excluding on investments = Subsidies on current operations linked to production (not investments), in €. Payments for cessation of farming activities are therefore not included.
Environmental subsidies (SE621)	ESU	€	Subsidies on environment (caution to avoid double-counting of DP under Art 69 of 1782/2003) + Subsidies on environmental restrictions.
Total support for rural development (SE624)	RDSU	€	= Environmental subsidies+ LFA subsidies + other Rural Development payments including RD national payments.
Agritourism (SE725)	ATR	€	Receipts from agritourism includes returns from board and lodging, campsites, cottages, riding facilities, hunting and fishing
Agritourism revenue as % of GFI	ATRShare	%	Agritourism Receipts as percentage of Gross Farm Income (computed from ATR and GFI).

Source: FADN, 2022.

Methodology

Descriptive statistics are presented to show the size of agritourism revenues in comparison to gross farm income, farm total output, farm profitability and other indicators of farm performance. The dynamic patterns of agritourism revenues are shown in contrast to the dynamics of other farm performance indicators. These results are compared by farm economic size categories. The size categories are defined based on the standard output of the farms, and are used separately to identify relationships within each size category. A similar method was used by Novotná and Volek (2018) in identifying productivity-related patterns in EU country groups defined by categories of annual Gross Value Added.

Correlation analysis is applied to reveal relationships between these variables. Variable distributions were tested for normality, but the Kolmogorov-Smirnov test rejected the normality assumption, and the usual data transformations did not help, either. Therefore nonparametric correlation (Spearman's rho), was applied, together with robust statistical methods to test group differences and relationships between variables.

To analyse the same observed units for several years, i.e. to carry out panel data analysis the Mixed Linear Model (LMM) of the SPSS software package was applied (IBM Corp., 2013; Landau & Everitt, 2004) to identify fixed and random effects of agritourism revenues on other farm preformance indicators, to reveal annual trends and separate relationships by economic size and country. In our models the various farm performance indicators were analysed, and the unit of analysis was the group of farms of a particular size category of a particular country. The economic size category was considered for fixed effects, together with time, and the size of agritourism revenues, as well labour force and subsidies received, etc.

The LMM structure is as follows (Landau & Everitt, 2004):

The dataset contains n observations (n =17 years, 2004,…2020) for N subjects (groups by 28 countries and 6 economic sizes), for which matrix X denotes the set of variables observed. X(i) is the matrix of independent variables for subject i, its rows containing the actual observations for the individual years. Let's assume that we have i=1,…N subjects, e.g. farm groups. We wish to determine the influencing factors of a selected trait (y) of these groups, for which we have n measurements over time (n years). The standard format of LMM is given by (Seltman, 2008; Stroup, 2013):

$$y(i) = X(i)\times B + V(i) \times b(i) + e(i)$$

where

- y(i) = [y(i,1),-----y(i,n)] denote the vector of n measurements (1, … , n) over time for subject i (i=1…N), i.e. group i, for the selected trait of this group;

- X(i): n × p matrix of p variables and n observations for group i, representing the variables having a fixed effect on group i;
- V(i): n × q matrix of q variables and n observations for group i, representing variables having a random effect on group i;
- B: a p ×1 vector of regression parameters fixed for all groups;
- b(i): q × 1 vector of subject-specific regression parameters;
- e(i): n × 1 vector representing random effects and errors for group i.

This model was applied to answer the following research questions:

- Does the level of agritourism revenues influence farm profitability and income?
- Does the effect of agritourism on profitability differ by size categories?
- Does the effect of agritourism revenues change by time?
- Does the involvement in agritourism differ by country and economic size, and does it change with time?
- Is there a relationship between agritourism revenues and received subsidies?

The analyses are done using SPSS 22.0 (IBM Corp, 2013), and MS-Excel-2013.

RESULTS AND DISCUSSION

Descriptive analysis of the 2004-2020 time period by economic size categories

Tab. 2 lists the mean values of selected indicators, for all years, countries and economic sizes. The mean values, standard deviations, and coefficients of variation (CV%) widely differ by economic size categories, as is shown in Fig. 1.

Table 2 Descriptive indicators for 2004-2020, EU-28

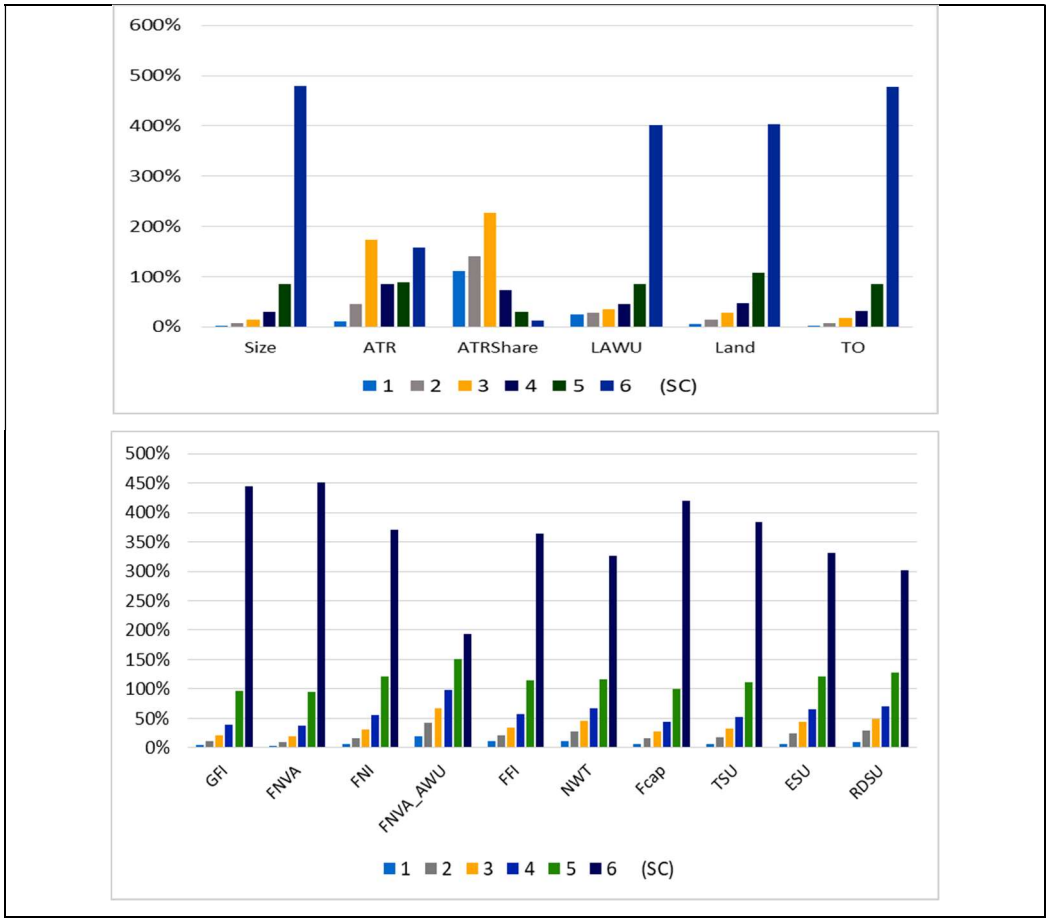
Variable	Mean	stDev	CV%	Variable	Mean	stDev	CV%
Size	243.82	418.70	171	GFI	130071.41	266494.8	174
ATR	471.54	1743.5	370	FNVA	98442.27	182406.9	185
ATRShare	1.03	3.82	370	FNI	46978.14	10296.0	217
LAWU	4.39	8.89	203	FNVA_AWU	20937.64	17440.4	83
Land	144.62	293.56		FFI	33910.46	65859.2	194
TO	272190.0	203491699.6	182	TSU	42543.12	76135.1	179
TA	854197.9	1186698.6	139	ESU	4958.56	10509.1	212
NWT	627223.72	790218.1	126	RDSU	8587.17	16360.4	191
FCap	509904.09	821586.9	161				

Source: Authors‘ construction.

Variation is extremely high, the CV values vary between 83% and 370%. Except for agritourism-related variables it is only category 6 – and occassionally category 5 – that

produce higher values than 100% (i.e. the all-sizes average). Category 6 has strikingly high values (300% of the mean or higher) regarding the actual economic size, the total labour force (LAWU), total agricultural land, and total farm output. The same is true for the various income-related indicators and subsidy values. Indicators related to agritourism revenue are highest for category 3. The absolute value of agritourism revenue is nearly as high in category 6 as in category 3, but regarding its share in GFI, the smaller size farms have higher values than the large ones.

Figure 1 Mean values for indicators by size category, as % of all farms' mean



Source: Authors' construction

Comparing the countries (Tab. 3), large differences are found, expressing the indicators in percentages of the EU-28 average. It is especially striking, that in agritourism revenue there are countries with practically no recorded performance in this regard (e.g. BG, CY, MT, RO), while NL has around 10 times as high values as the EU-average, and many other countries achieve more than double of the EU-average (AT, CZ, IT, SK, UK). In subsidy levels also large differences are shown, the smallest rates are around 4-20%, while the largest subsidy levels re more than 200-300% of the EU-average.

Table 3 Country level indicator means as % of EU-28 average

ST	Size	LAWU	Land	TO	GFI	FNVA _AWU	FFI	NWT	FCap	ATR	ATR Share	TSU
AT	30.2%	36.6%	23.8%	32.4%	45.1%	107.8%	58.5%	68.3%	74.8%	325.6%	400.0%	48.8%
BE	139.4%	54.5%	31.3%	116.1%	106.9%	174.4%	107.1%	88.1%	89.0%	84.8%	44.8%	49.9%
BG	111.3%	213.4%	214.1%	114.0%	140.5%	48.1%	163.8%	71.4%	90.5%	0.9%	1.0%	142.9%
CY	30.1%	42.7%	10.8%	21.5%	20.8%	42.7%	30.0%	37.6%	22.8%	0.2%	2.1%	18.9%
CZ	174.0%	231.3%	233.3%	179.9%	178.8%	71.4%	83.5%	138.0%	204.0%	225.6%	82.5%	285.1%
DE	150.4%	73.9%	92.8%	128.8%	129.3%	147.2%	86.5%	124.7%	102.1%	45.4%	41.4%	124.0%
DK	133.7%	41.2%	66.3%	145.6%	128.4%	257.4%	54.9%	160.5%	192.9%	87.5%	67.4%	84.7%
E7	101.8%	60.1%	52.9%	88.5%	89.4%	104.6%	89.1%	87.1%	82.4%	99.4%	110.7%	63.8%
E8	102.8%	67.4%	58.5%	88.1%	89.8%	100.7%	84.6%	95.3%	82.4%	98.2%	97.0%	66.8%
EE	116.4%	133.5%	234.5%	129.1%	113.7%	66.6%	103.1%	73.8%	121.4%	25.0%	63.3%	143.2%
EL	23.1%	42.0%	12.8%	21.7%	29.7%	73.9%	54.8%	27.1%	19.7%	1.6%	4.0%	27.0%
ES	106.5%	59.7%	38.6%	63.9%	73.8%	124.2%	126.0%	82.2%	62.0%	14.3%	11.4%	33.0%
FI	76.9%	50.5%	46.6%	84.6%	88.7%	116.1%	62.6%	66.3%	92.7%	83.6%	138.3%	163.5%
FR	104.6%	56.7%	52.5%	90.1%	93.9%	133.9%	79.5%	44.6%	85.1%	22.0%	14.6%	64.5%
HR	56.6%	59.5%	36.6%	43.3%	48.4%	65.0%	70.2%	57.3%	58.3%	8.3%	23.2%	61.6%
HU	135.0%	170.3%	168.2%	160.1%	149.5%	82.8%	124.4%	86.0%	128.3%	14.2%	29.9%	190.7%
IE	45.5%	32.0%	44.5%	49.4%	51.6%	137.3%	89.3%	202.3%	67.5%	2.7%	4.4%	59.5%
IT	136.4%	52.9%	26.3%	80.7%	100.7%	154.6%	152.7%	143.0%	75.4%	322.7%	264.1%	43.7%
LT	98.4%	166.7%	204.5%	129.3%	132.1%	65.4%	209.7%	97.8%	123.6%	4.3%	18.5%	113.4%
LU	90.7%	40.1%	57.1%	82.2%	98.8%	154.0%	82.5%	140.8%	142.0%	49.2%	25.2%	110.7%
LV	123.2%	232.7%	219.8%	168.1%	149.6%	48.1%	121.3%	85.5%	150.0%	36.9%	18.4%	167.2%
MT	47.8%	48.1%	2.3%	46.3%	32.1%	61.5%	47.4%	63.3%	62.7%	0.0%	0.0%	20.6%
NL	160.9%	63.1%	21.0%	162.2%	138.8%	183.7%	92.4%	208.2%	156.5%	1032.9%	978.7%	36.0%
PL	93.6%	118.6%	85.7%	100.8%	81.9%	54.3%	84.8%	79.3%	84.7%	18.9%	53.5%	67.2%
PT	77.7%	77.7%	37.3%	55.4%	59.3%	66.1%	107.7%	38.5%	34.9%	3.0%	8.1%	39.3%
RO	108.6%	164.4%	213.8%	135.0%	182.8%	87.2%	309.4%	104.7%	111.0%	0.5%	0.5%	153.6%
SE	104.6%	44.8%	92.4%	106.7%	93.2%	131.6%	38.5%	114.1%	130.0%	32.0%	83.8%	120.6%
SI	23.6%	47.3%	14.3%	23.2%	27.4%	37.3%	26.4%	54.3%	44.6%	72.5%	285.0%	31.5%
SK	174.5%	353.5%	384.8%	206.3%	195.2%	48.6%	84.5%	151.0%	226.0%	231.4%	113.4%	339.3%
UK	116.7%	60.7%	105.6%	113.6%	106.3%	134.2%	105.2%	242.0%	88.2%	295.4%	228.4%	99.1%

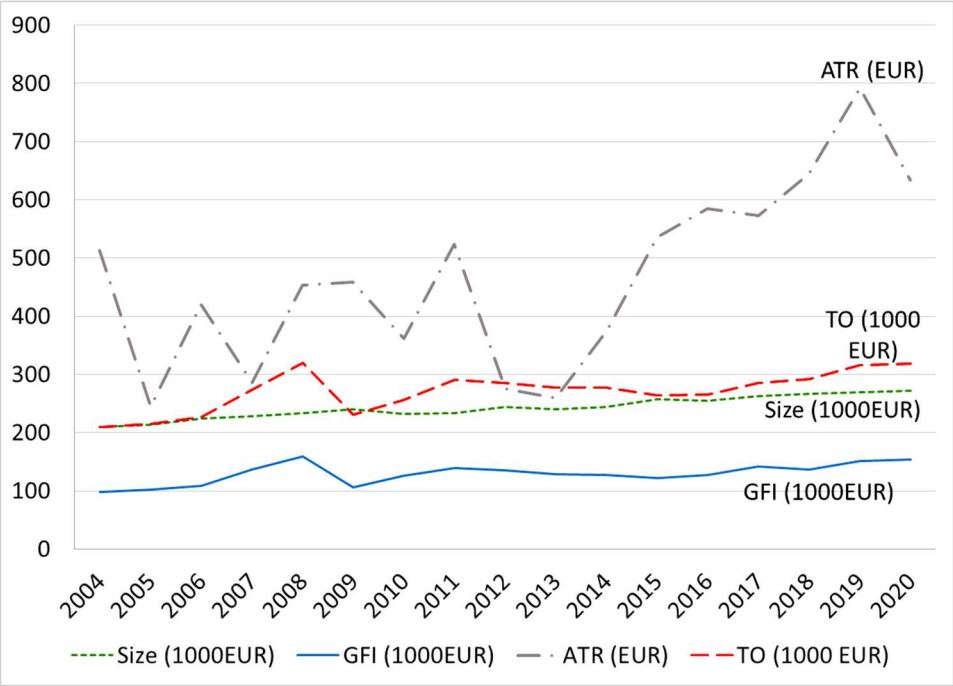
Source: Authors‘ construction

Time dynamics and correlations of agritourism indicators and farm performance indicators

Fig. 2 shows the temporal dynamics of agritourism revenues together with some basic agricultural indicators. As is seen from the figure, farm economic size continuously increased during the analysed period, while the other three indicators show fluctuating patterns.

Agritourism revenues move somewhat similarly to the total farm output and gross farm income tendencies. The global financial crisis of 2008-2009 shows a marked decrease in output and income, while agritourism revenues follow this trend (of 39% decrease) with a year delay. The impacts of the 2019-2020 Covid-crisis are not noticeable on farm output and GFI, but very visible on agritourism (35% decrease), which reflects the different character of this crisis from the global financial crisis of 2008.

Figure 2 The time trends of farm size, output, income and agritourism revenues



Note: ATR is in EUR (mean per farm), the other indicators in 1000 EUR (mean per farm).
Source: Authors' construction

The role of agritourism in farm incomes is reflected by the bivariate correlation coefficients (Tab. 4).

Table 4 Correlations of agritourism indicators and farm performance indicators

Spearman's correlation coefficients	Size	ATR	ATRShare	LAWU	Land
Size	1.000	.268**	-.023	.796**	.805**
LAWU	.796**	.021	-.234**	1.000	.695**
Land	.805**	.201**	-.039	.695**	1.000
TO	.978**	.253**	-.042*	.795**	.802**
GFI	.971**	.247**	-.052*	.812**	.811**
FNVA	.950**	.205**	-.091**	.826**	.782**
FNI	.823**	.131**	-.123**	.754**	.658**

Table 4 (continued)

Spearman's correlation coefficients	Size	ATR	ATRShare	LAWU	Land
FNVA_AWU	.778**	.306**	.064**	.446**	.571**
FFI	.828**	.165**	-.095**	.696**	.688**
TA	.872**	.329**	.055**	.553**	.679**
NTW	.847**	.321**	.056**	.533**	.639**
TSU	.888**	.234**	-.032	.703**	.914**
ESU	.573**	.340**	.174**	.360**	.652**
RDSU	.573**	.256**	.085**	.434**	.689**

***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tailed).*
Source: Authors' construction

Significant, medium level positive correlations (of at least 0.25) of agritourism revenues were found with economic size, total farm output, gross farm income, farm value added per AWU, total assets, net worth, and subsidies. This suggests that agritourism revenues are higher in larger farms (of more land or assets and standard output), and higher farm outputs and gross farm incomes are experienced when agritourism revenues are higher. Labour productivity (measured by FNVA_AWU), and net worth also increase with increasing agritourism revenues.

Higher ATR is associated with higher subsidies, too. It is worth noting that these relationships do not exist in connection with ATRShare. Rising proportions of agritourism revenue seem to be unrelated to GFI, TO or FNVA_AWU, i.e. ATRShare may rise as ATR rises with GFI unchanged, decreaseing or increasing. Looking at other correlations, a few relationships are worth mentioning. Size is strongly and positively associated with al asset- and income-related variables and subsidy levels, and the same is true for LAWU and Land, too. ATR is not related to LAWU, but ATRShare has a negative correlation, meaning that more labour goes together wit smaller share of agritourism in gross farm income.

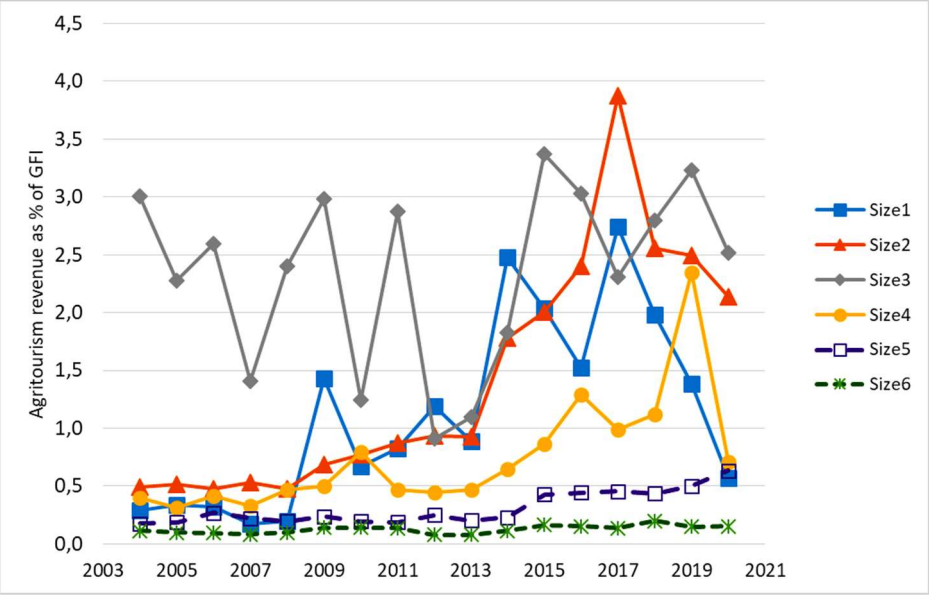
However, these correlations are measured for all data of 2004-2020 pooled, all countries, and all farm sizes, and as such, may hide important differences between various locations, sizes and times. For example, the correlation between pooled economic size values and agritourism receipts indicate that larger farms gain more agritourism revenues, while former research and Fig. 1 suggest, that small farms may benefit more from agritourism and other farm diversification activities, and therefore their income levels, and performance indicators

improve more than that of large farms. To distinguish between farm sizes, and to evaluate the patterns in time, more sophisticated statistical methods are needed.

Relationship between agritourism revenue and farm performance – panel analysis

Our key question is to what extent agritourism contributes to the economic performance of farms of various economic sizes. The various farm categories are involved in agritourism to a different extent, as is illustrated by Fig. 3 – showing the mean share of agritourism revenues in gross farm income. Size categories 1-2-3 and 4 (this latter especially from about 2015) are more involved in agritourism (having 1.0-3.5% share in GFI after 2015), while for categories 5 and 6 its share in GFI is less than 0.5%. This makes it reasonable to analyse the importance of agritourism separately for size categories.

Figure 3 The share of agritourism revenues in gross farm income, by size categories



Source: Authors' construction

Two approaches are applied for the rest of the analysis:

- To analyse the impact of agritourism on the economic performance indicators of farms;
- To assess the factors that influence the size of agritourism revenues.

The impact of agritourism on the economic performance of farms

To facilitate LMM analysis, the variables were transformed to their standardised scores (z-scores), each transformed value computed by subtracting the series mean from the original value, then dividing the result by the standard deviation of the original series. These z-score

variables were then used for the LMM analysis. In this analysis agritourism variables are among the independent variables in the LMM setup, while dependent variables are GFI, FNVA, FFI, TO, and NTW (their standardised, z-score values). The panel analysis resulted in the parameter estimates shown in Tab. 5.

As the LMM parameters and significance levels show, the economic size and the year have positive fixed effects on all the farm performance indicators, while the interaction of size with year showed significant negative fixed effects. The model uses the largest farm size category as the baseline, and the fixed effects can be interpreted as is described by the following equation for the example of (z-scored) GFI as dependent variable:

$$z\text{-}GFI_{(SC=6)} = -52.5622 + 0.0270 \times Year + 0.1361 \times z\text{-}ATR$$

For other size categories the given fixed effect estimate values modify the coefficients (when significant), as for example the equation for Size 4 is:

$$z\text{-}GFI_{(SC=4)} = -52.5622 + 53.3251 + (0.0270 - 0.0276) \times Year + (0.1361 - 0{,}1351) \times z\text{-}ATR$$

This gives us for z-GFI (size6) in *Year=2004* an equation with intercept 1.585, meaning, that its value in 2004 is 1.585, and similarly, in 2020 it is 2.017 with zero z-ATR, as each year the z-GFI increases by 0.0270 (i.e. GFI increases by 2.7% of its standard deviation), and with 1 unit increase in z-ATR (i.e. 1 unit standard-deviation increase in ATR), z-GFI increases by 0.1361.units (i.e. GFI grows by 13.61 % standard deviation.).

For the smaller economic sizes the starting value at year 0 is defined by higher intercepts (*-52.5622* plus the estimated value for the relevant size,) but the relevant slopes with year are much smaller (*0.0270* plus the negative estimate for the relevant *size × year* interaction), which means that for size 5 and 6 the slope remains positive, for size 1 zero, and for sizes 2-3-4 it is negative. The impact of agritourism revenue is significant and positive for size 6, while size 1 and 2 do not differ from it significantly (i.e. they experience the same impact as size 6). The impact is significantly different for sizes 3, 4 and 5, but smaller, size 4 having the smallest (but still positive) impact, followed by size 3, then size 5. These results seem somewhat contradictory to the message from Fig. 3, but Fig. 3 does not measure the absolute impact of agritourism revenue, but its proportion to GFI, with decreasing importance for sizes 3-2-1-4 -5-6; the different order reflecting the different levels of GFI, which is much higher for higher sizes that for smaller ones.

Table 5 Agritourism impacts on farm performance indicators – LMM estimates

Fixed Effect Parameter Estimates	z-GFI	z-FNVA	z-FFI	z-TO	z-NWT	z-TA
Intercept	-52.5622**	-52.016**	-137.041**	-58.073**	-84.973**	-94.656**
Year	0.0270**	0.0267**	0.069**	0.030**	0.043**	0.048**
[SC=1]	51.9872**	51.552**	134.180**	57.444**	82.795**	92.917**
[SC=2]	52.7712**	52.181**	134.567**	57.416**	79.050**	89.945**
[SC=3]	53.3422**	52.997**	135.376**	57.785**	73.368**	86.284**
[SC=4]	53.3251**	52.965**	132.990**	57.618**	72.909**	85.574**
SC=5]	47.9797**	48.687**	117.293**	52.403**	67.028**	76.774**
[SC=6]	0[b]	0[b]	0[b]	0[b]	0[b]	0[b]
[SC=1] * Year	-0.0270**	-0.0267**	-0.068**	-0.030**	-0.042**	-0.047**
[SC=2] * Year	-0.0274**	-0.0270**	-0.068**	-0.030**	-0.040**	-0.046**
[SC=3] * Year	-0.0276**	-0.0274**	-0.068**	-0.030**	-0.038**	-0.044**
[SC=4] * Year	-0.0276**	-0.0274**	-0.067**	-0.030**	-0.037**	-0.044**
[SC=5] * Year	-0.0248**	-0.0251**	-0.059**	-0.027**	-0.034**	-0.039**
SC=6] * Year	0[b]	0[b]	0[b]	0[b]	0[b]	0[b]
z-ATR	0.1361**	0.1311**	-0.118**	0.059**	-0.155**	-0.077**
[SC=1] * z-ATR	-0.1402	-0.144	0.055	-0.056	0.168	0.088
[SC=2] * z-ATR	-0.1336	-0.136	0.080	-0.049	0.203+	0.108
[SC=3] * z-ATR	-0.1291**	-0.124*	0.123*	-0.052*	0.140**	0.071**
[SC=4] * z-ATR	-0.1351**	-0.1315*	0.119+	-0.054+	0.208**	0.112**
[SC=5] * z-ATR	-0.1139*	-0.109+	0.118	-0.034	0.310**	0.195**
[SC=6] * z-ATR	0[b]	0[b]	0[b]	0[b]	0[b]	0[b]
Random effect variances						
Residual	0.1146**	.172339**	.2939**	.0555**	.08542**	.052769**
Intercept + Year	4.35E-08**	4.34E-08**	8.57E-08**	4.00E-08**	7.64E-08**	6.28E-08**
R^2	0.9761**	0.9584**	.8299**	.9841**	.9702**	.9761

b. This parameter is set to zero because it is redundant (baseline)
***. Correlation is significant at the 0.01 level (2-tailed*
**. Correlation is significant at the 0.05 level (2-tailed);*
+. Correlation is significant at the 0.1 level (2-tailed).
Source: Authors' construction

The random effect of year is significant for all sizes meaning that there is considerable individual variance around the modelled mean fixed effects by time. Similar results were found with dependent variables Farm net value added, Family farm income, and Total farm output, Net worth, and Total Assets. However, the sign of the agritourism impact varies:

- it is positive for Total farm output, and Farm net value added;
- it is negative for family farm income, net worth and total assets;
- its size-interaction effects are just the opposite, i.e, compared with size 6, the other significant sizes are impacted somewhat less that size 6;
- for FFI and TO the sizes significantly differing from size 6 are 3 and 4, while for FNVA, NWT and TA these are 3-4-5 (and for NWT, size 2 at 0.1 level).

Factors influencing agritourism revenues

As the panel regression revealed (Tab. 6, Model1), Agritourism revenues significantly differ by economic size, compared to size 6, the differences are significant and positive (i.e. reaching above average revenues) for size 1 and 3 (the highest value), and significantly

increase with time. However, compared to size 6 farms the annual growth is significantly slower for size 1, and actually turns to the negative for size 3. The total subsidy level is positively related to ATR.

With a different model structure (Tab. 6, Model 2), however, agritourism revenues are significantly, and positively related to not only year, but to total assets, and total subsidy level, while negatively related to average farm capital, and the size of agricultural land. Labour and the actual economic size do not have additional impacts besides the other listed variables. Again, random effects are significant for both model structures, and goodness of fit is much weaker, (0.48 – 0.49 respectively).

Table 6 Fixed and random effects influencing Agritourism revenues

Model1		Model2	
Fixed Effects estimates (dependent: z-ATR			
Intercept	-56.9670**	Intercept	-22.0442904751**
Year	0.0281**	Year	0.0108953925**
[SC=1]	50.3653*	TA	0.0000001907**
[SC=2]	30.2843	Fcap	-0.0000003992**
[SC=3]	72.8359**	TSU	0.0000048677**
[SC=4]	12.3390	LAWU	0.0067258597
[SC=5]	15.3620	Land	-0.0007582498*
[SC=6]	0[b]	Size	0.0002114070
[SC=1] * Year	-0.0249*		
[SC=2] * Year	-0.0149		
[SC=3] * Year	-0.0359**		
[SC=4] * Year	-0.0060		
[SC=5] * Year	-0.0075		
[SC=6] * Year	0[b]		
TSU	3.2105E-06**		
Random effects variance			
Residual	.49100**	Residual	.49076**
Intercept + Year	1.1054E-07**	Intercept + Year	1.0733E-07**
R^2	0.4789**	R^2	0.4914**

b. This parameter is set to zero because it is redundant (baseline)
***. Correlation is significant at the 0.01 level (2-tailed);*
**. Correlation is significant at the 0.05 level (2-tailed);*
Source: Authors‘ construction.

CONCLUSION

Our results show, that farm economic size matters with regard to the importance of agritourism in farm economic performance.

As we proved, for 28 EU-countries and 6 farm size categories, smaller farms rely to more extent on agritourism revenues, the share of agritourism in GFI ranges from 1.0% to 3.5 - 4% for sizes 1, 2 and 3, while for sizes 5 and 6 it remains under 0.5% The results show, that the highest share is, however, not in the smallest size category, but for category 3 (25000-50000 EUR annual standard output). Probably, this size category possesses sufficient assets, labour, amenities to provide for better services to tourists, therefore it is capable of gaining higher revenues compared to other components of GFI.

Impacts of total agritourism revenues on farm incomes, output and assets also differ by size. Agritourism revenues impacted similarly the incomes and outputs of farms belonging to size 6, and sizes 1-2 − i.e. the largest category and the two smallest one. They experienced the highest positive impacts on GFI, while sizes 3-4-5 differed from these, and from each other, too, with the smallest benefits in absolute values experienced by size 4 and 3. Net worth, Total assets experienced negative impacts, i.e. smaller values for those having higher agritourism revenues (sizes 6 and 1-2). At the same time, sizes 4 and 5 reacted positively to higher agritourism revenues. Size 3 was also negatively impacted, but to a lesser extent than 6, 1 and 2. It is interesting to see, that while their income gains were lower, their gains in net worth and assets were higher – it may be related to spending more on farm improvements, and having different investment strategies.

Generally, all farm size categories differ by their temporal dynamics, the fastest growth in revenues and other performance indicators is experienced by size 6 (the largest category), followed by size 5, then size 1, size 4, and finally sizes 3 and 4 showing the slowest growth with time. This means, that small farms grow faster than medium size farms, which gives them possibility for catching up, and develop, while the two largest categories keep their advantage, probably due to different management and organisation strategies, better access to markets and external resources, while possessing more internal resources and abilities, as well.

Regarding the factors influencing the level of agritourism performance, i.e. the size of revenues arising from agritourism, farm size categories differed again. Belonging to size categories 6, 5, 4 and 2 meant actually smaller agritourism revenues than size 1, but all these categories produced negative z-ATR, i.e. below average agritourism revenues, and size 3

produced the highest z-scored agritourism revenue, being the only one reaching above average revenue levels. Time dynamics of agritourism revenues also differed by size, the fastest growth being in sizes 6-5-4-2 categories followed by size 1, and changing into a small decreasing pattern for size 3, i.e. faster growth is experienced by those having less revenues initially. With higher total assets, and higher total subsidies received, agritourism revenues increased, while higher average farm capital and total agricultural land indicated smaller revenues from agriculture – probably having the main focus on traditional agricultural production, instead of this diversifying activity.

Our findings are partly similar to former research results, but they also contradict some of them. The present findings support the general view that farm size matters in the involvement of agritourism activities. However, while most of the American studies indicate that small farms profit the most (Joo et al., 2013; Hollas, 2021), our findings about the EU show, that while small farms also benefit, it is most often the medium size farms that can reach the highest revenue levels. This is true not only for income levels, but for the net worth and total assets of farms, too. Our results show, that larger net worth and larger total assets are associated with smaller agritourism revenues, and the medium size farms gain the most in net worth and total assets from having high agritourism revenues. Our results agree with the conclusions about Italy by Arru et al. (2021), that the relationship between agritourism and farm performance is somewhat controversial, but overall, the medium size farms seem to be most involved in, and benefiting from agritourism activities. The novelty of the present study is its long time span, and its wide geographical focus, compared to former studies, that dealt with shorter time spans and smaller areas. Another novelty is the methodology of panel regression, that allows for differentiation of country, farm size and temporal effects. The results also underline that the EU support policy positively influence agritourism activity, which reflects the multifunctionality of rural regions, contributing to environmental sustainability, economic viability and preservation of rural heritage at the same time.

The present results point to further research directions. One such research question is to do a similar analysis not only with country averages, but at the level of NUTS2 regions. As countries are not homogeneous regarding their natural environment, regions different in their tourism appeal and agricultural suitability, possibly having on impact on the relationship of agritourism, farm sizes and farm profitability. Another research focus can be the comparison of the EU member states by their business environment. Factors of the business environment can have a considerable impact on the performance of the agricultural sector, typical farm sizes, profitability, labour use, and involvement in agritourism. Control factors, such as

average GDP per capita, agricultural and overall tax rates, labour and income share of agriculture in the national economy, or the share of less favoured areas in the total agricultural area could be incorporated to the statistical models to reveal more specific relationships between agritourism and farm profitability.

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