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RESEARCH ARTICLE

Evaluation of agricultural policies implemented with respect to less favoured area's: evidence from Turkey*

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ABSTRACT

There have been many different agricultural support tools varying by countries. These agricultural support tools are determined according to different indicators such as the policies, expectations, regions, and economic levels of the countries and may differ from each other. One of these agricultural support tools is Less Favoured Area (LFAs) that has been applied for a long time. Turkey has many geographically different regions and many different agricultural support tools like those in the other counties However, considering the EU full membership process policies, a specified support tool for the LFAs, which are widely used in the EU, has not been implemented in Turkey. Mersin province is one of the areas where that is an issue and so was selected for this study. The province has a dual structure, with high mountains (Taurus) and wide plains. People in the mountainous areas make a living from animal production, especially goat breeding. The study framework was based on the logistic regression model, which was compared farmers' descriptive statistics and socio-economic features in villages in the mountainous/semi-mountainous areas and on the plains of Mersin province. Farmers' intentions for land allocation and livestock and their migration tendencies were analysed in different scenarios. Age, experience, number of small ruminants, land size and credit usage were found to have a statistically significant effect on farmers' decisions about continuing farming. Their decisions changed across the policy scenarios provided, and a policy that considers regional differences was found to be significant in their decisions. The paper shows agricultural support policies should consider regional differences to compensate for income losses due to physical conditions.

Keywords: Agricultural support; Environmental policy; Mountain area; Natural handicaps; Turkey

INTRODUCTION

All countries support their agricultural sectors because of their unique characteristics. Their objectives in supporting agriculture include ensuring its sustainability, improving farmers' welfare, responding to the basic needs of consumers at affordable prices, eliminating income inequalities between urban and rural sectors, protecting natural resources, ensuring rural development, and enhancing the contribution of the agricultural sector to the national economy (Unuvar and Dellal, 2016).

An examination of agricultural support practices around the world reveals that the different countries have varying support instruments, including the support extended to less-favoured areas (LFAs). LFAs are supported because of their difficult topography and climatic conditions, the presence of low-income groups living under challenging circumstances, the limited nature of services and investments, and the resulting relative socio-economic backwardness.

Support extended by countries to ensure sustainable production in their agricultural sectors assumes various forms. In Turkey, support to agriculture is extended by using various instruments, but this support does not vary at a national scale in amounts or to regions. In other words, the support is uniform, with the same items and amounts throughout the country. One time, a basin-based support program was started, but the level of success could not be achieved especially in practice. Besides, there is no kind of LFA support instrument in the Turkish agricultural policy. Therefore, this study's importance was to predict ex- ante how farmers' decisions would change in the presence of the LFA policy that does not exist in Turkey. LFA support should be consider 'bottom up' approach for Turkey, such as like the EU LEADER (**Liaison entre actions de développement de l›économie rurale** –In

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English- Links between actions for the development of the rural economy) programme which is known one of most important tool of local development action (Dax and Oedl-Wieser 2016). Our aim is estimates that LFA supports play important role in disadvantages area and mountain area. As known, heterogeneity in agriculture is an important (van Keulen 2006) and we could be turned it advantages through efficiency agricultural support policy especially in the LFA's.

Mention of LFA support intended to mitigate regional disparities was first included in the relevant literature by the EU Commission (EC) Report in 1975. This support had a dual purpose: to approach the agricultural sector concerning, first, its economic function of contributing to the national economy, and secondly, its social purpose in protecting nature and the environment (EC, 1975). The concept became common in the early 2000s by studies measuring the impact of support policies (Dax, 2002; Ruben and Pender, 2004; Ruben et al., 2006; Štolbová, 2007, 2012)

In the 1975 EC report, LFAs are approached through their physical and socio-economic characteristics, including the presence of low-income groups in general, difficult circumstances surrounding agricultural production, limited opportunities for investment and services, harsh climate conditions, and weak interest on the part of private investors (EC, 1975; Oskam et al., 2004; Bogdanov, 2014). They are also referred to as areas with 'permanent physical handicaps' (Oxouzi et al., 2012). According to definitions in EC reports on LFAs (EC, 1975), there is a 'compensation payment system' (Crabtree et al. 2003). After reforms in 2013, the term 'less-favoured areas' was changed to 'areas with natural constraints' (ANCs) (EC, 2016). In this definition, it also included different situations such as negative climatic factors, slope, and poor soil conditions. In order to comply with this field definition and to be eligible for support, one of the following three conditions must be met (EC, 2020.)

- *Mountain areas, which are demarked due to their altitude or the steepness of their slopes;*
- *Areas facing significant natural constraints, these are based on 8 biophysical criteria's, plus a process known as 'fine tuning';*
- *Other areas affected by specific constraints, these are limited to 10% of the EU countries total area and are defined by the EU country itself (original emphasis).*

Areas defined as such correspond to 25% of the total surface area of the EU (Porqueddu et al., 2017), extending over 91 million hectares of land (Střeleček et al., 2008). Over time, however, with the increase in the number of member countries, this share increased to 57% (Eliasson et al., 2010; Giesecke et al., 2010). Agricultural land in countries in the Mediterranean zone is often defined as less favoured. LFAs that make up the 57%, according to the 2009 EC report, are further classified as 'other LFAs' (31%), 'mountainous areas' (16%), and 'areas with specific constraints' (9–10%). People engaged in agricultural activities in 'other LFAs' (31%) made up 7% of all farmers and 1.4 million farmers were supported (EC, 2009; Eliasson et al., 2010).

A large majority of the world's population lives in LFAs (Fan and Chan-Kang, 2004), and 915 million people live in the mountainous areas (FAO, 2015) that constitute 22% of the world's land surface (Romeo et al., 2015). The less-favoured and mountainous areas are those where the effects of poverty, agricultural inefficiency, low agricultural income, poor education, and social opportunities are severe (Fan and Hazell, 2000; Pender, 2004; Ruben et al., 2006; Romeo et al., 2015). Along with demographic factors and factors related to health and education, LFAs are marked by biophysical and socio-economic disadvantages: living in low-income groups; sloping land, prone to drought, flood and erosion; rainfall pattern; poor soil quality; little use of technology; short farming periods; high production and processing costs (Oxouzi et al., 2012; Štolbová, 2012; Klepacka et al., 2013), cheap labour (Ruben and Pender, 2004); and limited access to markets (Nagy Havadi et al., 2015).

Concerning agriculture, less-favoured and mountainous areas are better fit for such activities as viticulture, olive culture and forestry, besides sheep and goat farming and some other forms of animal husbandry (Dax, 2004; De Rancourt et al., 2006; Hambrusch, 2014; Špulerová et al., 2016). LFAs account for 70% of total sheep and goat production in the EU. In these areas, sheep and goat farming is an important economic activity that supports rural development and entails preserving livestock, pastures and biodiversity, and the prevention of erosion Sheep and goats are highly adaptive animals and can adapt to different natural environments and enterprise types (Castel et al., 2011).

A large part of Turkey consists of mountainous, rough and sloping areas and agricultural production is carried out in these areas. There is yet no definition of a 'less-favoured area' in Turkey. Therefore, given that the country's physical characteristics resemble some parts of the EU, LFA support is also important for Turkey as well. At this point, Turkey has areas that fit the EC definition of an LFA, so the province of Mersin in Turkey was selected for a field survey.

There are 470 thousand farming in Turkey with sheep and goats, and 44 million small ruminants, of which 11 million are goats (Turkstat, 2018). With its favourable geographical and climatic characteristics, the Mediterranean region accounts for 26.3% of goat farming. Mersin province takes the lead with 27.9%, followed by Antalya province (23.9%). Easily adapting to challenging topography and

climate conditions, mohair goats stand out as an important means of subsistence for farmers in the mountain and forest villages of the region where the socio-economic status is lower (Dellal 2000). Another factor contributing to the indispensability of goat breeding is that fact that the majority of breeders are 'Yörüks' (Unuvar, 1984) who inhabit the Taurus Mountains where goats can find large pastures (İnalcık, 2014). The field area's definition was determined mainly by slope, short growing seasons, and poor soil quality from the EU's biophysical criteria. Mersin was selected because the province, located on Turkey's south coast, is surrounded by high mountains (as one of Turkey's roofs), and has areas with these characteristics. The Taurus Mountains lie in three chains in a belt extending from west to east across Turkey. Mersin province is on the slopes of the central and south-eastern chains. Because of its location, Mersin's summer temperatures average more than 30 °C in July and August.

MATERIAL AND METHODOLOGY

The main material of this study consists of data collected from agricultural farms active in Mersin province. The study framework was based on the logistic regression model, which dates back to the 1800s and has become common since then (Cramer, 2002; Wilson and Lorenz, 2015). Farmers were asked what would change (land size/ livestock/migration tendency) in their area in the following scenarios:

S1: If existing support continues?
S2: If existing support is removed?
S3: If less-favoured area support is made available?

The data and model framework are discussed in more detail below.

Data

In addition to primary data obtained through a questionnaire administered in villages in the mountains and plains of the province, earlier studies on the topic were used. In sample selection, the proportional sampling technique was applied to 3.673 farmers registered with the Farmer Registry System (ÇKS) of Mersin as of 2017. Based on a confidence interval of 90% and an error margin of 7%, the sample size was determined as 138 farmers (Table 1). According to EC, 2009 report's features definition of the mountains area, LFA and especially mountain features (as a geographic, ecological, agronomic, and socio-economic/demographic) also has been applied to Taurus mountain in Turkey.

As stated before, there is no LFA identification in Turkish agricultural policy. However, there are many other policy tools relating to Turkey's animal and plant production systems. The existing support for sheep and goat breeding in Turkey was 25 TL/head, means 4,40$ per each animal (the address existing support in Scenario (S1)), and some of them received fertiliser–oil support 21 TL/da (3,57$/da) support (oil support 17 TL/da and fertilizer support 4 TL/ da) in 2019 (TOB, 2019). And all the farmers interviewed received for these supports.

The model framework

Logistic regression analysis is a statistical method used to determine the relationship between more than one observable variable using dependent and independent variables (Agresti and Kateri, 2011; Sperandei, 2014). The rationale for using this method in the survey was that data obtained from farmers were categorical and resulted from of asking farmers what course of action they would adopt in case of any change in scenario. The logistic regression method allowed the researcher to observe farmers' behaviour and attitude to determine their opinion of structural and future changes. It gave a general idea of budget planning and budget allocation based on their responses to policies implemented and changes taking place. According to recent studies, there is also evidence that social factors influence farmer decisions, despite the presumptive nature of some of the intentions stated (Wehn et al., 2011; Giannoccaro and Berbel, 2013; Huber et al., 2015; Barnes et al., 2016).

An ex-ante survey was conducted by applying the LFA support model, not implemented in Turkey, to various scenarios. Analyses and inferences were made based on land size, the number of livestock and the farmers' migration tendency.

Table 1: Definition of Study Area

Settlements Area	EU's Definition	Observed Number	Note
Plain	1 & 5	40	The 138 surveys were proportionally distributed according to these settlements.
Semi-mountainous	1 & 2	55	
Mountainous	1, 2, 3 & 4	43	
EU's Biophysical Criteria Definition**			
Attitude (1) <599 m (plain) 600–999 m (semi-mountainous) 1.000–1.600 m (mountainous)	Slope (2) Short growing season (3) Poor soil quality (4) Temperature [avg. July 30.8 °C, August 31.6 °C for Mersin] (5) * heat criterion added by us		

**The features of these areas were determined from the main biophysical criteria of the EU (EC, 2009).

The probability of the desired event ($Y = 1$) which is referred to as p, can be expressed:

$$P(Y=1|X_1,X_2,X_3\ldots.,X_p)=\frac{e^{\beta_0+\beta_1X_1+\ldots..\beta_pX_p}}{1+e^{\beta0+\beta1X1+\ldots..\beta pXp}} \quad [1]$$

$$P(Y=1|X_1,X_2,X_3\ldots.,X_p)=\frac{e^{\beta_0+\beta_1X_1+\ldots..\beta_pX_p}}{1+e^{-(\beta_0+\beta_1X_1+\ldots..\beta_pX_p)}} \quad [2]$$

The probability of an unwanted event ($Y = 0$) $1 - p$ can be expressed:

$$P(Y=1|X_1,X_2,X_3\ldots.,X_p)=1-\frac{e^{\beta0+\beta1X1+\ldots..\beta pXp}}{1+e^{\beta0+\beta1X1+\ldots..\beta pXp}}=\frac{1}{1-P(Y=1|X_1,X_2,X_3\ldots.,X_p)}=\frac{1}{1+e^{\beta0+\beta1X1+\ldots..\beta pXp}} \quad [3]$$

They are equal to each other.

The odds expression is also called the *probability ratio*. The odds ratio is:

$$Odds\ P(Y=1|X_1,X_2,X_3\ldots.,X_p)\ ratio\ \frac{p}{1-p}=e^{\beta0+\beta1X1+\ldots..\beta pXp} \quad [4]$$

When the natural logarithm (Ln) of both sides of the equation is taken, logistic regression analysis turns the relationship between the dependent variable and the independent variable turns into a linear state (Equation [5]):

$$Log\ (P)=log\left[\frac{p}{1-p}\right]=\beta_0+\beta_1X_1+\ldots..\beta_pX_p \quad [5]$$

Independent variables are listed in Table 2.

Dummy variables:

$$R=\begin{cases}1, & if \quad R_{wheat}<0\\ 0, & \geq 0\end{cases}$$

DESCRIPTIVE STATISTICS AND ECONOMETRIC RESULTS

The farmers' socio-economic parameters and survey results are shown in Tables 3 and 4, respectively.

As to the basic demographic characteristics of farmers, the average age of farmers in all the settlements where the survey was conducted was 48, as shown in Table 3. The average ages of farmers living in mountainous and semi-mountainous areas and on the plains were 46, 53 and 42, respectively. The youngest of the farmers, at age 19, was living in a mountainous area, and the oldest, at age 75, was from a settlement on a plain. Farmers' educational status did not vary by settlement locations, and 81.9% were primary school graduates. These farmers were not included in the logistic regression analysis.

In terms of economic indicators, these were mostly small family farms, where 50.1% had their annual farming income from Category 2 (10.001–20.000 TL); 21.7% of farmers declared annual income from Category 3 (20.001–30.000 T); 18.8% had annual farming income in Category 4 (>30.001 TL); and 9.4% of farmers said their annual farming income fell into Category 1 (5.001–10.000 TL).

Experience is an important and determining factor in farming in terms of decision-making, adoption of innovations, sustainability and applicability. The average length of farming experience was 30.6 years for all settlements. It was higher, around 35 years, in mountainous areas. To benefit from the support scheme, farmers had to be members of ÇKS and DKKYB (unions of sheep breeders and goat farmers, respectively). In our case, all the farmers were DKKYB members. As shown in Table 3, membership to the Chamber of Agriculture (ZO) was 83% for all settlements, and it was the highest (89%) in mountainous areas. The Agricultural Credit Cooperative (TKK) plays an important role in supplying inputs to farmers, and its membership was 36%, which makes it the third preferred organisation. The fourth was the Union of Milk Producers (MU), with 15%; however, this figure jumped up to 33% in mountainous areas, where milk production is higher and farmers are mostly milk suppliers. Other forms of membership were limited and were all shown as a single option with a membership rate of 25%.

Considering the number of livestock by settlement, we found that the region was rich in sheep and goat stock. Sheep and goats were preferred, mainly for their high returns to feed and suitable topography. Cattle owned by farmers were mainly for domestic -household- consumption, and farms kept, on average, 1–2 head of cattle for their yearly milk and yoghurt needs because sheep and goats yield milk only seasonally. If farms that do not own cattle bartered milk among themselves to meet year-round milk needs.

The cost of feed was the most challenging issue for farmers. Even when farmers took their animals out to

Table 2: Status of variables included in the model

Modal Variables		Statutes of Variables
Age (year)	Age of farmers	Continuous
Income* (Turkish Liras-TL)	1, 2, 3, 4	Categorical
Households (number of persons)	How many?	Continuous
Experience (year)	How long?	Continuous
Credit-using	Y:1, N:0	Dichotomous
Settlement	1:M, 2:S–M, 3:P	Categorical
Goats (head)	<50, 51–100, 101–150, 151–250, >250	Categorical
Sheep (head)	<9, 9–50, 51–150, >151	Categorical
Land size (da)	<20, 21–40, 41–60, >61	Categorical
Parcel (number)	How many?	Continuous
Wheat	(0,1)	Dummy
Fallow area	(0,1)	Dummy
Chickpea	(0,1)	Dummy
Olive	(0,1)	Dummy
Vineyard	(0,1)	Dummy

*Income categories: (1): 5.001–10.000 TL, (2): 10.001–20.000 TL, (3): 20.001–30.000 TL, (4): >30.001TL. Written in the relevant category in accordance with the farmers' statements (1TL=0,17$ avg.2019)

Table 3: Farmers' socio-economics indicators

Variables	Mountainous Area		Semi-mountainous Area		Plain Area		Total	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std
Age	46.35	11.76	52.82	10.11	42.18	12.76	47.72	12.21
Level of education	3.09	0.65	3.18	0.58	3.48	0.82	3.24	0.69
Number of people in household	4.07	1.35	3.53	1.14	3.90	1.06	3.80	1.20
Income	2.21	0.74	2.22	0.71	3.20	0.94	2.50	0.91
Share of agricultural income (%)	90.47	17.21	91.48	17.47	94.25	15.17	91.97	16.70
Non-agricultural employment	0.28	0.45	0.24	0.43	0.18	0.38	0.23	0.42
Experience (years)	28.74	13.58	35.06	12.95	26.35	13.14	30.57	13.64
UBSGF (DKKYB)	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
CA (ZO)	0.70	0.47	0.89	0.32	0.87	0.34	0.83	0.38
ACC (TKK)	0.28	0.45	0.45	0.50	0.33	0.47	0.36	0.48
MU (SB)	0.33	0.47	0.13	0.34	0.00	0.00	0.15	0.36
Other union*	0.19	0.39	0.31	0.47	0.23	0.42	0.25	0.43
Cattle (head)	1.05	6.13	0.82	2.12	0.73	3.54	0.86	4.11
Sheep (head)	54.07	72.97	33.53	73.10	118.63	161.05	64.59	111.34
Goats (head)	173.44	121.20	145.80	91.70	184.75	172.40	165.70	128.69
Bees (no. of hives)	0.30	1.42	0.51	1.50	2.88	7.87	1.13	4.52
Observations	43		55		40		138	

* Other unions: Irrigation Association, Agricultural Sales Cooperative Union, Forest Cooperatives

graze either on common pastures or on their own land, they still needed intensive feed and roughage, both as a supplement and when it was impossible to take them out. While the amount of feed consumed depended on the size of the herd and animal weight, each farmer still had to give about one kilogram of intensive feed per animal per day, and most of the roughage needed was obtained from mowing their own land.

Goats are animals suited to challenging topography with rugged terrain and rocky areas. Therefore, farmers were asked about their grazing periods and sources. Since farmers in flatter areas and plains mostly moved to higher lands in summer, the response 'pastures' was most common (67%). All settlements had similar responses: 62% of farmers moved to the highlands and remained there, on average, for four months. The most of 38% said they did not move to highlands because they lived in mountainous areas.

POLICY SCENARIOS DISCUSSIONS AND RESULTS

There are many studies regarding the impact of agricultural support. These studies show that agricultural support positively affects agricultural income and production, and farmland markets (Kirwan and Roberts, 2010), and decreases risk and credit constraints (O'Toole and Hennessy, 2015). Studies also show the effects of agricultural support on LFAs. The LFA supports increases agricultural income, creates an environmentally friendly policy and

implementations, and improves rural living conditions. It was shown that the effect of agricultural support on farm income risk, farm income risk decreased in non-LFAs and income risk increased in LFAs due to farm heterogeneity and other different variables in Slovenia (Bojnec and Fertő 2018). From another point of view, the Polish Carpathian Mountains showed that the importance of LFA support could compensate for the low yield of cereal and potatoes as altitude increases in the mountain area. (30% lower yield at 700 m altitude compared to wheat cultivation at 500 m) (Kowalczyk et al. 2014). A comparative study in Italy showed that the support of the 2. pillar goes to the plains of 66% and the mountainous area of 19%, which points out the gap between the plain-mountainous area (Zolin et al. 2020). It concluded that the LFA support in Poland also encourages the employment of labour in the areas where the rural population intensively works in agriculture (Zawalinska et al. 2013). In France, while emphasizing that environmentally friendly dairy and cattle farms in mountainous areas experienced an increase in income thanks to this support, it showed that the effect of LFA support on pasture areas was weak (Vollet and Kirsch 2019). Unay-Gailhard and Bojnec, (2020) emphasised that LFA payments played an essential role in forest farmers' financial recovery after the 2014 ice storm in Slovenia. Štolbová (2008) determined that the LFA support in Belgium, Cyprus, France, Greece, Ireland, and the UK increased farm income per person; and, in France, Ireland, Italy, Portugal, Slovakia and the UK, it increased livestock density.

Attitudes to land size in case of a policy change

The outcomes of logistic regression analysis showing how farmers' decisions on land size would change if the existing support were lifted are given in the annexure.

The attitudes of farmers towards having their support lifted varied meaningfully as a result of several variables. For example, the tendency to stay on already-cultivated land was significantly higher in statistical terms for older farmers when there is a change in scenario (**). It suggests that policy change is a more influential factor for younger farmers. In general, age was a determining factor in decisions taken by farmers.

Coming to a statistically significant variable, farmers with 101–150 and >250 goats (**) shared the tendency not to change their cultivated land if support were lifted. A similar statistically significant case was observed among sheep breeders (**, ***). The number of land parcels was also a determining variable, where the area of harvested land did not change according to policies implemented if the number of parcels was high. Those who tended to reduce their land under cultivation because of a policy change already had larger plots. To be more specific, farmers with more than 61 decares of land tended to reduce their land size in the event of a negative policy change.

Table 4 shows how farmers' attitudes would change if LFA support were introduced as a new support scheme. Again, age came to the fore in determining decisions to maintain or change the present situation. A statistically significant (**) result was that, as the farmers grew older, they were more resistant to changing the extent of land under cultivation.

Compared to other groups, farmers in the first two income groups found the prospect of a new support scheme more important and displayed a greater tendency to expand the land under cultivation. A similar positive attitude was observed among those who cultivated wheat. Both of these results were statistically significant (**, ***).

As a variable, settlement location also yielded a statistically significant result: Farmers on the plains were less inclined to change their cultivated land than those who lived in mountainous and semi-mountainous areas.

Attitudes towards keeping livestock in case of a policy change

As can be seen in the Table 4, farmers tended not to make any change in their livestock if existing support was removed. Age was a statistically significant variable (**), showing older farmers were less sensitive to support schemes. This age group showed no tendency to alter the number of animals they had if support were removed.

Farmers who used loans were more inclined than those who did not have them to reduce the number of animals they had if support were removed. A similar response was found amongst farmers whose farms were larger than 61 decares. Farmers in the group with the most cultivated land were more inclined to reduce their land under cultivation than others.

As the number of sheep and goats increased (**), farmers' tendency to maintain their stock level outweighed other options in the case of support being lifted. As the number of animals grew higher, this decision became firmer as a result of the coefficient. As farmers had more land parcels (**), their desire to maintain the number of animals strengthened accordingly.

Decisions of farmers concerning their livestock were examined in the context of the availability of LFA support. As the farmers grew older, their attitude to keeping their livestock numbers at the same level hardened. An important point here, however, is related to experience. Unlike other logistic scenario outcomes, when giving the LFA support, it was determined that it was members

Table 4: Econometric Results

Variables	Land Size Decisions		Livestock Decisions		Migration Tendency Decisions	
	Removing Current Support	Giving LFA Support	Removing Current Support	Giving LFA Support	Removing Current Support	Giving LFA Support
Age	-0.0824*	-0.1174***	-0.1339**	-0.0840*	0.0932	-0.0718**
	(0.0453)	(0.0448)	(0.0539)	(0.0459)	(0.0891)	(0.0327)
Income category 2	0.5541	2.6592**	0.3431	1.6402	-1.6983	0.3075
	(1.3219)	(1.1344)	(1.3826)	(1.3055)	(1.6665)	(0.8148)
Income category 3	1.5070	2.8793**	2.0380	0.6180	0.7399	0.8517
	(1.4145)	(1.3470)	(1.4693)	(1.4836)	(1.9419)	(0.9361)
Income category 4	1.9814	0.5198	1.2290	-1.0727	-2.1927	-0.0007
	(1.5733)	(1.3636)	(1.6528)	(1.5784)	(2.1466)	(1.0611)
Household	-0.1007	-0.2543	-0.2271	0.2190	0.5946	-0.1977
	(0.2965)	(0.3130)	(0.3479)	(0.3441)	(0.4820)	(0.2070)
Experience	0.0322	0.1080***	0.0686	0.1267***	-0.1248*	0.0755***
	(0.0381)	(0.0377)	(0.0445)	(0.0440)	(0.0746)	(0.0291)
Credit-using (Y:1, N:0)	0.7945	-1.9828**	1.2900*	-2.6331***	2.4620*	-1.2332**
	(0.7086)	(0.8055)	(0.7814)	(0.9590)	(1.3281)	(0.4867)
Semi-mountainous area	0.5782	-1.8575	0.4884	-4.0633**	-2.4146	-1.4759**
	(0.8981)	(1.2011)	(0.9549)	(1.6144)	(1.7809)	(0.6499)
Plain Area	-1.6907	-2.6838**	-0.7375	-3.8495**	-1.9222	-0.3798
	(1.0944)	(1.2289)	(1.0662)	(1.5886)	(1.7040)	(0.6830)
No. of goats (51–100)	-1.4573	0.0128	-2.4526*	0.4283	0.4497	-0.7971
	(1.3306)	(1.3421)	(1.4353)	(1.7379)	(2.0384)	(0.9856)
No. of goats (101–150)	-2.8304*	-0.5087	-3.5718**	-1.5752	4.5710*	-0.0413
	(1.4640)	(1.2347)	(1.5532)	(1.2795)	(2.5863)	(0.9887)
No. of goats (151–250)	-1.0235	-1.3650	-2.0276	-1.9920	3.6811	-0.5034
	(1.2625)	(1.2432)	(1.4049)	(1.3950)	(2.2551)	(0.8957)
No. of goats (>250)	-2.4590*	0.4223	-4.4929***	-0.3543	-1.3598	-0.5261
	(1.4032)	(1.2785)	(1.6918)	(1.2819)	(2.2830)	(0.9447)
No. of sheep (9–50)	-1.7584	-0.3344	-2.2698*	-1.0936	1.6926	-0.7248
	(1.2066)	(0.9400)	(1.2764)	(1.0136)	(1.5953)	(0.7023)
No. of sheep (51–100)	-0.9319	1.3558	-1.4519	-0.7039	-4.9392*	-0.7959
	(0.8863)	(1.1311)	(0.9283)	(1.2264)	(2.6569)	(0.7448)
No. of sheep (>101)	-4.4223***	1.0878	-6.8917***	1.4428	2.2934	-0.4005
	(1.6899)	(1.1042)	(2.0783)	(1.1741)	(1.7657)	(0.8220)
Land size (21–40)	-0.5384	-0.5521	-1.0267	0.3371	-3.4098*	-0.5374
	(0.8592)	(0.9486)	(0.9259)	(0.9506)	(1.7645)	(0.6630)
Land size (41–60)	0.3050	0.1366	-0.6456	2.2119*	-1.0880	-0.6145
	(1.1320)	(1.0614)	(1.3256)	(1.3129)	(1.5133)	(0.7745)
Land size (>61)	3.5325**	-1.4582	4.3854**	0.1643	-5.8676**	-0.7080
	(1.7337)	(1.4631)	(1.7606)	(1.4492)	(2.9682)	(1.1477)
Parcel	-0.1945**	-0.0319	-0.2401**	-0.1449*	-0.1972	0.0577
	(0.0934)	(0.0736)	(0.0951)	(0.0843)	(0.1757)	(0.0606)
Wheat (1.0)	-0.9379	1.4184*	-0.7830	2.0504**	3.8087**	-0.4897
	(0.7537)	(0.8585)	(0.7809)	(0.9428)	(1.6039)	(0.5868)
Chickpea (1.0)	-1.2085	1.4019	-1.4924	1.6612	2.3033	0.3991
	(1.3471)	(1.1683)	(1.2857)	(1.2482)	(1.7473)	(0.8296)
Fallow land (1.0)	-0.7082	1.1058	-0.5231	2.2463**	3.0837***	-0.5887
	(0.7878)	(0.7653)	(0.8652)	(0.9545)	(1.1277)	(0.5706)
Olive (1.0)	0.4002	0.1161	0.4662	-0.0451	3.5622**	0.1627
	(0.7431)	(0.7017)	(0.7903)	(0.6955)	(1.4300)	(0.6044)
Vineyard (1.0)	0.6590	-0.6156	0.6339	-0.3965	1.0365	0.3085
	(0.8065)	(0.7910)	(0.9021)	(0.9165)	(1.7040)	(0.6447)
Constant	3.8482	5.6110**	6.8585**	4.9888*	-9.6155**	3.2784*
	(2.6787)	(2.5531)	(3.1999)	(2.8279)	(4.8553)	(1.9131)
Observations	132	131	130	135	135	135

P value:*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

of the more experienced group who were more likely to increase the number of their livestock. Age is not necessarily always positively correlated with experience (because older individuals engage in agricultural activities after retirement).

Compared to those who did not have loans, farmers who had them displayed less tendency to change the number of their animals. The location of the settlement appeared important and statistically significant. The dominant tendency in plains was not to change the number of animals, unlike mountainous and semi-mountainous areas. Concerning land size (**), farmers with 41–60 decares of land were more inclined than others to change the number of animals as the number of land parcels increased (**).

Migration tendency in case of policy change

The Table 4 annexed shows the tendency to migrate if existing support schemes were lifted. This part of the study investigated whether farmers would decide to move somewhere else if support schemes no longer existed. The 'migration' here is to leave own agricultural production, with family members to go to cities and work as workers in non-agricultural jobs.

Experience was statistically significant in this regard (**), and more experienced farmers were more stable in their attitude to migration than less experienced farmers. The tendency to migrate was higher among loan-using farmers than among others.

Farmer groups with the number of goats (**) in the 100–250 interval had a higher tendency to migrate than other farmer groups if support were lifted. Amongst sheep farmers, having 51–150 animals was statistically significant (**), and farmers with sheep in this interval displayed did not think about migrating.

Also, statistically significant (**) was the amount of land under cultivation, where farmers with 21–40 and >61 decares of land showed no tendency to migrate. If support schemes were lifted, wheat and olive farmers and those engaged in fallowing chose to migrate more frequently than other farmers. The tendency to migrate was also less evident among those living in semi-mountainous areas (**) than among those living in mountainous areas.

CONCLUSION

This study examined the importance of the LFA, which is an agricultural support tool that is sensitive to regional differences and plays an important role in disadvantaged areas and mountainous areas. This support could be prevent abandonment agricultural land that high cost and low output in the LFA. Therefore, it is necessary to increase support to farms in LFAs to mitigate the risk of poverty. It has been considered that LFA support can be an instrument that is quite related to UN's SDG goals which address to directly and indirectly for provides sustainability production, social-rural development, eliminates income inequalities, improve of quality of rural life, increases production potential, and provides on-site employment. Therefore, LFA support must be sensitive to compensate for the negative yield and production losses of the place where farmers live. Turkey needs an agricultural support model geared to eliminating regional development disparities and responding more effectively to farmers' needs. From a socio-economic point of view, LFA support is one of the core objectives that should be created a 'bottom up' approach to an environmentally friendly society in disadvantages and mountain areas.

Authors' contributions

Fatma Ilknur Unuvar; Conceptualization, data collection and analysis, methodology & writing.

Ilkay Dellal; Conceptualization, review & editing.

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REFERENCES

Agresti, A. and M. Kateri. 2011. Categorical data analysis. In: International Encyclopedia of Statistical Science. Springer, Berlin, Germany, p. 206-208.

Barnes, A., L. A. Sutherland, L. Toma, K. Matthews and S.Thomson. 2016. The effect of the common agricultural policy reforms on intentions towards food production: Evidence from livestock farmers. Land Use Pol. 50: 548-558.

Bogdanov, N. 2014. The Development of Support for Less Favoured Areas and Deprivileged Regions: Challenge of Agricultural Policy in Serbia. 2014 International Congress, August 26-29, 2014. European Association of Agricultural Economists, Ljubljana, Slovenia. Available form: https://ageconsearch.umn.edu/record/186679. [Last accessed on 2018 Oct 09].

Bojnec, Š., and I. Fertő. 2018. Assessing and understanding the drivers of farm income risk: Evidence from Slovenia. New Medit. 17: 23-35.

Castel, J. M., Y. Mena, F. A. Ruiz, J. Camúñez-Ruiz and M. Sánchez-Rodríguez. 2011. Changes occurring in dairy goat production systems in less favoured areas of Spain. Small Ruminant Res. 96: 83-92.

Crabtree, R., T. Dax, G. Hovorka, M. Köbler, F. Delattre, G.H. Vlahos and E. Haggrén. 2003. Review of Area-based Less-Favoured Area Payments Across EU Member States. Tryside and Environment Agencies, CJC Consulting, Karnataka.

Cramer, J. S. 2002. The Origins of Logistic Regression. Tinbergen Institute Working Paper No. 2002-119/4. Elsevier, Netherlands.

Dax, T. 2002. Research on Mountain Development in Europe-

overview of Issues and Priorities. Federal Institute for Less-Favoured and Mountainous Areas, Vienna, Austria, p15.

Dax, T. 2004. The Impact of EU Policies on Mountain Development in Austria Toward a Policy Model for Multifunctional Agricultural and Rural Development (TOPMARD) View Project ESPON Alps 2050 View Project. In Regional Studies Association-international Conference Europe at the Margins: EU Regional Policy, Peripherality and Rurality 2004, Angers, France. Available from: https://www.researchgate.net/publication/239539082 [Last accessed on 2020 May 18].

Dax, T. and T. Oedl-Wieser. 2016. Rural innovation activities as a means for changing development perspectives-an assessment of more than two decades of promoting LEADER initiatives across the European Union. Stud. Agric. Econ. 118: 30-37.

De Rancourt, M., N. Fois, M. P. Lavín, E. Tchakérian and F. Vallerand. 2006. Mediterranean sheep and goats production: An uncertain future. Small Ruminant Res. 62: 167-179.

Dellal, İ. 2000. Antalya Ilinde Kıl Keçisi Yetiştiriciliğine Yer Veren Tarım Işletmelerinin Ekonomik Analizi ve Planlaması, Doctoral Dissertation. Ankara Üniversitesi, Ankara.

Eliasson, Å., R. J. A. Jones, F. Nachtergaele, D. G. Rossiter, J. M. Terres and J. Van Orshoven. 2010. Common criteria for the redefinition of Intermediate Less Favoured Areas in the European Union. Environ. Sci. Policy. 13: 766-777.

EC, European Commission. 1975. Council directive of the 28 April 1975 on mountain and hill farming and farming in certain less-favoured areas (75/268/EEC). Regulation. 10: 1-7.

EC, European Commission. 2009. Towards a Better Targeting of the Aid to Farmers in Areas with Natural Handicaps. European Commission, Brussels.

EC, European Commission. 2016. Assessment of Capacity for Ecosystem Services in Agricultural Areas, Focusing on Areas with Natural Constraints. EU Publications. Available from: https://www.op.europa.eu/en/publication-detail/-/publication/6a1ff878-c32e-11e5-8d08-01aa75ed71a1/language-en/format-PDF/source-114663914 [Last accessed on 2018 May 18].

EC, European Commission. 2020. Areas of Natural or Other Specific Constraints (ANCs), European Commission 2020. Available from: https://www.ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/income-support/additional-optional-schemes/anc_en [Last accessed on 2021 Apr 29].

Fan, S. and C. Chan-Kang. 2004. Returns to investment in less-favored areas in developing countries: A synthesis of evidence and implications for Africa. Food Policy. 29: 431-444.

Fan, S. and P. Hazell. 2000. Should developing countries invest more in less-favoured areas? An empirical analysis of rural India. Econ. Polit. Week. 35: 1455-1464.

FAO. 2015. Mapping the Vulnerability of Mountain Peoples to Food Insecurity. FAO, Rome, Italy, p82.

Giannoccaro, G. and J. Berbel. 2013. Farmers' stated preference analysis towards resources use under alternative policy scenarios. Land Use Pol. 31: 145-155.

Giesecke, J., M. Horridge and K. Zawalinska. 2010. The Regional Economic Consequences of Less Favoured Area Support: A Spatial General Equilibrium Analysis of the Polish LFA Program (General Pa.). The Centre of Policy Studies (COPS). Available form: http//www.monash.edu.au/policy [Last accessed on 2020 May 18].

Hambrusch, J. 2014. The 2013 common agricultural policy reform and its impact on small ruminant farming in Austria. Stud. Agric. Econ. 116: 13-17.

Huber, R., C. Flury and R. Finger. 2015. Factors affecting farm growth intentions of family farms in mountain regions: Empirical evidence for Central Switzerland. Land Use Pol. 47: 188-197.

İnalcık, H. 2014. The yörüks: Their origins, expansion and economic role. CEDRUS. 2: 467-495.

Kirwan, B. E. and M. J. Roberts. 2010. Who really benefits from agricultural subsidies evidence from field-level data. Am. J. Agric. Econ. 98: 1095-1113.

Klepacka, A. M., T. Sobczyński, W. J. Florkowski and C. Revoredo-Giha. 2013. Effects of the Common Agricultural Policy on Non-family Farm Employment in Primary and Secondary Agricultural Areas. Agricultural and Applied Economics Association Conferences, 2013 Annual Meeting, Washington, DC.

Kowalczyk, A., A. Kuzniar and M. Kostuch. 2014. Analysis of criteria for delimiting less favoured mountain areas (LFA). J. Water Land Dev. 22: 17-24.

Nagy Havadi, X. K., P. Jordan, O. Ilovan, T. F. Zametter, M. Cristea and S. Tihamér-Tibor. 2015. The sustainable development of less-favoured areas: A study of the romanian and austrian experiences. Rom. Rev. Reg. Stud. 11: 19-30.

O'Toole, C. and T. Henness. 2015. Do decoupled payments affect investment financing constraints? Evidence from Irish agriculture. Food Policy. 56: 67-75.

Oskam, A. J., M. H. C. Komen, P. Wobst and A. Yalew. 2004. Trade policies and development of less-favoured areas: Evidence from the literature. Food Policy. 29: 445-466.

Oxouzi, E., K. Melfou, M. Galea and E. Papanagiotou. 2012. Economic performance and crop farm efficiency in mountainous and other less favoured areas in Greece. Bulg. J. Agric. Sci. 18: 846-853.

Pender, J. 2004. Development pathways for hillsides and highlands: Some lessons from Central America and East Africa. Food Policy. 29: 339-367.

Porqueddu, C., R. A. M. Melis, A. Franca, F. Sanna, I. Hadjigeorgiou and I. Casasus. 2017. The role of grasslands in the less favoured areas of Mediterranean Europe. Grassland Sci. Europe. 22: 3-22.

Romeo, R., A. Vita, R. Testolin and T. Hofer. 2015. Mapping the Vulnerability of Mountain Peoples to Food Insecurity. FAO, Rome.

Ruben, R., M. H. Kuiper and J. Pender. 2006. Searching development strategies for less-favoured areas. NJAS-Wagen. J. Life Sci. 53: 319-342.

Ruben, R. and J. Pender. 2004. Rural diversity and heterogeneity in less-favoured areas: The quest for policy targeting. Food Policy. 29: 303-320.

Sperandei, S. 2014. Understanding logistic regression analysis. Biochem. Med. 24: 12-18.

Štolbová, M. 2007. Comparative analysis of less-favoured areas payments in the EU states. Agric. Econ. 53: 455-465.

Štolbová, M. 2008. Eligibility criteria for less-favoured areas payments in the EU countries and the position of the Czech Republic. Agric. Econ. 54: 166-175.

Štolbová, M. 2012. An evaluati Eur. Countrys. on of the relevance of EU less favoured areas policy for dry regions of the Czech Republic. Eur. Countryside. 3: 282-298.

Střeleček, F., J. Lososová, R. Zdeněk. 2008. Economic results of agricultural holdings in less favoured areas. Agric. Econ. 54: 510-520.

Turkstat. 2018. Animal Statistics. Available from: http://www.turkstat.gov.tr/PreTabloArama.do?metod=search&araType=vt [Last accessed on 2020 Jun 04].

Unay-Gailhard, İ. and Š. Bojnec. 2020. Public support effect on natural disaster management: A case study of ice storms in

forests in Slovenia. Land Use Pol. 95: 103811.

Unuvar, F.I. and I. Dellal. 2016. Avrupa Birliği OTP ÇerçevesiNde Dezavantajli Bölgelere YöneliK Uygulamalar. Vol. 7. Ulusal Tarım Ekonomisi, Isparta/Türkiye, p915-924.

Unuvar, S. 1984. Mut Çevresinde Yaylacılık ve Yayla Kültürü. (Master Thesis) Ankara Üniversitesi Sosyal Bilimler Enstitüsü, Ankara.

van Keulen, H. 2006. Heterogeneity and diversity in less-favoured areas. Agric. Syst. 88: 1-7.

Vollet, D. and A. Kirsch. 2019. How efficient is the french less-favoured area programme? EurChoices. 18: 10-17.

Wehn, S., B. Pedersen and S. K. Hanssen. 2011. A comparison of influences of cattle, goat, sheep and reindeer on vegetation changes in mountain cultural landscapes in Norway. Landsc. Urban Plan. 102: 177-187.

Wilson, J. R. and K. A. Lorenz. 2015. Modeling Binary Correlated Responses using SAS, SPSS and R. ICSA Book Series in Statistics, Springer, Germany.

Zawalinska, K., J. Giesecke and M. Horridge. 2013. The consequences of Less Favoured Area support: A multi-regional CGE analysis for Poland. Agric. Food Sci. 22: 272-287.

Zolin, M. B., A. Pastore and M. Mazzarolo. 2020. Common agricultural policy and sustainable management of areas with natural handicaps. The Veneto Region case study. Environ. Dev. Sustain. 22: 7587-7605.