

## FACTORS AFFECTING THE TURKSIH FARMERS' DECISION TO QUIT FARMING

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### **Abstract**

*Agriculture contributes to Turkish economic development by manufacturing essential agricultural products, utilizing a huge portion of the population, trading of agricultural products, making intermediate goods for the other sectors. However, poverty along with deepening gap between input and output prices caused by Turkish agricultural policies implemented in the recent years has pushed farmers to quit farming. As a matter of fact, in 2017 5.4 million worked in agricultural sector, which were 7.7 million people in 2000. Therefore, object of this study was to investigate the factors affecting farmers' likelihood to quit agriculture. The data was collected by a questionnaire conducted in the selected districts of Izmir and totally 195 farmers are calculated as sample size. Logit regression model was used to determine the factors affecting quitting agriculture. The results show that agricultural subsidy, tenure, education and the size of the farm are the important factors for quitting decision. The question of who will make agricultural production in the future will be on the agenda as long as agriculture loses attractiveness for young people. The situation is no different in a country with a high young population country like Turkey. Hence, agriculture should be encouraged especially for young people with high education and entrepreneurship ability.*

**Key words:** exit intention, employment, choice models, rural development

### **INTRODUCTION**

In each country, agriculture has different conditions, but still contributes to the economies of countries. While the resources are gradually decreasing, supply of healthy and cheap food for the coming generations becomes more important. Therefore, whether it is a developed or a developing country, it is necessary for agriculture and agricultural enterprises to be sustainable. Despite this importance, farmers around the world are aging and young people move away from agriculture. The average age of farmers in Japan is 67 years and 58 years in the USA. More than one third of European farmers are older than 65. All OECD countries have ageing farmers [9].

The situation is similar also in Turkey. In 2000, 4.9 million people aged between 20 and 39 were employed in agriculture. This figure decreased to 3.4 million in 2010 and to 1.5 million in 2016. These figures show us that Turkish farmers are aging and that young people do not prefer to participate in

agriculture. Over the last 20 years, rural areas of Turkey are reshaped by an unbroken loss of both farm and nonfarm rural residents. Between 1991 and 2001, a number of 890,173 active farms in Turkey exited from farming. As a result the average farm size raised to 6.1 hectares from 5.9 hectares [6].

After the year 2000, expanding divergence among input and output prices has added to the extending of poverty in rural of Turkey. This was joined by a decline in agricultural lands. Over the most recent 10 years, around 2 million hectares of agricultural land are dropped from cultivation. Likewise, the total agricultural land and plantation areas have diminished.

When examining the number of agricultural holdings, as per the outcomes of the 1980, 1991 and 2001 General Agricultural Census, there was an expansion of 25.6% in 1991 regarding 1980 and 8.3% expansion in 2001 contrasted with 1991. While there has dependably been an expansion in absolute number of agricultural holdings in the majority of the three censuses, the quantity of

agricultural holdings occupied with agricultural activity has expanded by 19.1% from 1980 to 1991, and diminished by 9.6% from 1991 to 2001. As the quantity of agricultural holdings not occupied with farming is analyzed, it is seen that there has been an expansion of 86.7% from 1980 to 1991, and an increment of 117.5% from 1991 to 2001 [18]. The most noteworthy increment number of agricultural holdings occupied with farming in 1991 contrasted with 1980 was seen in the Mediterranean Region with rate 43.5% while the quantity of agricultural holdings drew in agriculture has diminished in all regions from 1991 to 2001. The most elevated amount of decline has been seen in the Aegean Region with rate 14.8% [18].

On the other hand, 413 thousand hectares land has been diversified from agricultural land to different usage types. Most of this land has been switched to constructional and tourism land. 30.10% of agricultural land changed to constructional and tourism land, 29.34% is unused, or undeveloped potentially productive land, 40.56% is other types [18].

Other than all these, structural problems in Turkish agriculture drive the farmers to stop cultivating. The movement of the youth from rural to urban territories additionally causes challenges in providing agricultural workers. As a result, the political decision makers decided in March 2016 to provide rural development grant support for young farmers in order to encourage them to continue their production in the countryside or to return to the village.

The changing structure of the rural area influences equity, profitability and efficiency of agriculture, and the welfare of rural. While numerous studies recommend that adjustments in profitability result from modifications made on individual farms, a great part of the change might be the outcome of the entry and leave process [3]. Hence, the entry and leave process keeps on being a factor in maintaining competitiveness, and in assigning resources between agriculture and the other sectors.

The basis of farm exit has been an issue of interest for researchers for quite a while. The majority of the contribution to the literature

has originated from works done on the USA farms. The farmers who choose to stop cultivating look at the utility they get from cultivating versus they got from stopping. The majority of the studies done on this topic rest on this assumption. Transaction costs associated with this displacement (including relocation) are also an important determinant [5]. As long as the costs are lower, the propensity to quit farming will be higher. Most studies focus on a few variables, particularly on the off-farm employment [1], [2], [10], [5], [4]. There has been very little empirical work analyzing these problems, notably at the farm level [19], [5], [14], [7], [3], [15], [8], [11], [17].

Current studies address a number of factors that affect the farmer's ability to continue (or leave) agriculture mostly for developed countries. This leaves crucial gaps for developing countries. Therefore, this paper estimates the factors that have effects on farm exits using Turkish farm-level data. A logit regression model was applied to the data to analyze factors affecting farm exits decisions. Knowing which types of farms are more probably to exit may be helpful to policy makers about the consequences of exits on the exiting, the remaining farmers, and rural.

This paper is divided into four sections. Section II specifies how the data are treated for the purpose of implementing the farm exit model and a framework for analyzing probability of farm exit as a function of conditioning variables. Section III discusses the factors influencing farm exit and then provides results. Section IV concludes.

## MATERIALS AND METHODS

This paper uses the data that were collected in a farm survey. The survey observed individual Turkish farms across ten districts of İzmir. The survey on which this analysis is relied on consists of 195 randomly selected farmers. The sample size was determined with the finite population proportional sample size method [12]. 7% standard error and 95% confidence interval was accepted. The questionnaire that was used for this study contained inquiries to capture farming

activities, attitudes toward farm and non-farm activities, policy support and plans for future farming.

To examine the characteristics of farms leaving Turkish agriculture, the probability of farm exit is estimated as a function of affecting variables. The logit model is constructed for the empirical analysis. With farm exit being observed in pairs of adjacent years, a farmer is assumed to have a discrete choice at the end of each year – exit or stay- and this decision show up in the following year.

From this model, the log likelihood function for estimation is:

$$\ln L = \sum_{t=2}^T \{EXIT_{it-1,it} \ln F(X_{it-1}\beta) + (1 - EXIT_{it-1,it}) \ln [1 - F(X_{it-1}\beta)]\}$$

The marginal effect of a parameter on farm exit is denoted as,

$$\frac{\delta E(y|x)}{\delta x_k} = F(\beta x) [1 - F(\beta x)] \beta_k$$

The variables used in the analysis are summarized in Table 1. The dependent variable EXIT reflects the response to the question, “Are you planning to continue farming in the future?” The variable was coded “1” if the respondent answered “No” and “0” otherwise. The independent variables (regressors) include farm size, farmer’s age, education, family size, and experience in farming, agricultural support, rent and credit, all of which are expected to affect exit decision,  $X_{it}$  (Table 1).

Table 1. Description of Variables

Variable	Description and Units
EXIT	1=plan to exit from farming, 0=otherwise
SIZE	Land, in decars
AGE	Age, in years
EDU	Education, in years
MEMB	Household members, count
EXP	Farmer’s experience in farming activity, years
SUB	1=having agricultural subsidy, otherwise=0
TENURE	1=being tenure, otherwise=0
CREDIT	1=having loan, otherwise=0

Source: Own calculations.

The farm size is measured by the variable SIZE. The variable SIZE reflects the total

amount of arable land used by the farmer. The variable size is expected to have a negative effect on the likelihood of exiting from farming.

Farmers’ characteristics are represented by age (AGE), education (EDU), farming experience (EXP) and the number of family members working on the farm (MEMB). Farmers are more likely to quit farming as they approach retirement age. The variable EDU represents the availability of alternative employment options in the model. We consider that farmers with some education are progressively competitive in the off-farm employment and, are bound to get new skills required for alternative employment. In addition, it is expected to positively affect the likelihood to exit from farming. When the farmer is less experienced in agricultural activities, it is expected that farmer prefers not to stay in agricultural sector.

It is normal that farmers with a moderately high number of family members working on the farm prefer to continue farming. [13], [16], [4], and [3] proposed that the quantity of family members living or working on the farm essentially affects the succession of farm and subsequently the choice to stay or to exit from cultivating.

In the model, agricultural subsidy (SUB) represents the agricultural policy conditions for Turkey. The more subsidies farmers have, the less likely they are to leave farming. The variable TENURE reflects whether the farmer has owned or leased land. The variable was coded “1” if the farmer has leased land and “0” otherwise. Tenure is predicted to be positively affecting likelihood of leaving from cultivating. When the farmer has a bigger share of owned land, it is expected that farmer prefers to stay in the agricultural sector.

The variable CREDIT reflects whether the farmer use loans or not. The variable was coded “1” if the farmer has used loans and “0” otherwise. CREDIT is expected to have a positive effect on likelihood of exiting from farming because for farmers with larger loans, farm exit rates are higher.

## RESULTS AND DISCUSSIONS

The logit model estimates a farmer's propensity to exit from farming on explanatory variables. This is accomplished by maximizing the log likelihood function, given in the equation (1). Table 2 shows the estimates of the logit regression. A negative value indicates that the factor reduces the likelihood for exit, whereas a positive value works within the other way.

Before referring to the results of the model, it is better to look at whether the model is statistically significant or not. The model is significant at the one percent, as indicated by LR chi-square statistics. Regarding the accuracy of the model, 154 out of 195 farmers were predicted properly, that is an accuracy of 79.0%.

The Chi<sup>2</sup> test of linear restriction was used to test for overall model fit. The null hypothesis is that the joint coefficients of the independent variables are equal to zero. The null hypothesis is rejected at 1% significance level. The results show that at least one of the independent variables is different from zero.

When the results of the model are examined,

it is seen that four factors affect the probability of quitting farming. These are agricultural subsidies, tenancy status, education and the farm size. If the results of the model are considered, it is seen that the agricultural subsidies and the size of the farm decrease the possibility of quitting farming. However, education and having rented agricultural land increases the chances of leaving farming.

Obviously, the agricultural subsidy (SUB) negatively affects the likelihood of exit and is significant at 5% significance level. It is frequently discussed that high agricultural supports and agricultural product prices minimize structural change in agriculture because they lead to enlarged profitability. Therefore, discourage farmers from exiting [3]. Contrarily, [1] proposes that subsidy payments do not really influence changes in the number of farms and farmers' decisions. However, according to Table 2, farmers who have high agricultural supports are less likely to quit farming in Turkish agriculture. This result is compatible with [5]'s findings.

Table 2. Results of Logit Model

<b>Dependent Variable: EXIT</b> (1) plan to exit from farming (0) otherwise					
<b>Independent Variable</b>	<b>Coefficient</b>	<b>Standart Error</b>	<b>z</b>	<b>p- value</b>	<b>Mean of X</b>
<b>Constant</b>	-2.73	1.47	-1.85	<b>0.0637*</b>	----
<b>EXP</b>	0.03	0.02	1.52	0.1285	25.06
<b>SUB</b>	-1.04	0.47	-2.21	<b>0.0269**</b>	0.83
<b>TENURE</b>	0.99	0.40	2.45	<b>0.0143**</b>	0.57
<b>AGE</b>	0.001	0.02	0.05	0.9570	49.22
<b>EDU</b>	0.15	0.08	1.79	<b>0.0731*</b>	6.22
<b>SIZE</b>	-0.003	0.002	-1.67	<b>0.0947*</b>	10.09
<b>MEMB</b>	-0.06	0.13	-0.46	0.6388	3.69
<b>CREDIT</b>	0.67	0.41	1.62	0.1047	0.65
<b>Log-likelihood</b>		-97.52097	<b>LR</b>		Chi-square(8) = 20.339 [0.0091]
<b>McFadden R-squared</b>		0.094433	<b>S.D. depended var</b>		0.428807
<b>AIC</b>		213.0419	<b>BIC</b>		242.4989
<b>Number of cases correctly predicted</b>		79.0%	<b>Linear restrictions</b>		chi <sup>2</sup> (8) = 16.7265, p-value = 0.0330859

\* Significance level 0.1; \*\* significance level 0.05; \*\*\* significance level 0.01.

Source: Own calculations

As the farmer owns more arable land, the likelihood of the farm exit reduces. We found similar result like [5]. Farm exit probability is lower for Turkish farmers whose owned land share is high. As expected, the variable TENURE has a positive effect on the likelihood of exit decision and is significant at

5% significance level. On the other hand, [3] stated that the farmers could establish an emotional link with their own lands and hence their willingness to quit farming could be low. In addition, the high proportion of owned land in the property will allow a farmer to reach

the loans more easily and have a high credit capacity [3].

As indicated in Table 2 we found that the farm size (SIZE) is adversely related to the likelihood of farm exit. Farm exit probability is lower for larger farms rather than small farms. [10] recommended that farm size would positively help succession of farms because larger farms are more likely to support the farmer and his family with a modest and sustainable income. Therefore, opportunity costs of leaving farming for larger farms are higher.

Education variable positively and significantly affect the likelihood of exit from farming. This verifies the hypothesis that farmers with some education may easily enter to alternative employment options. This will make it easier

for farmers with high levels of education to quit farming.

It is also important to measure the marginal effects as well as the direction of the factors that affect the likelihood of quitting farming. According to the obtained marginal effects, one unit increase in the agricultural subsidies and farm size will cause the likelihood of existing farming to decrease by 20.48% and 0.06% respectively. These variables affect farm exit decision in a decreasing way. The other two variables, namely tenure and education have positive effects on existing farming decision. One-unit increase in rented arable land and education increases the existing rate by 15.85% and 2.58%, respectively (Table 3).

Table 3. Marginal effects of the logit model

Variable	dy/dx	Std. Err.	Z	P> z	[ 95% C.I. ]		Mean of X
EXP	.005742	.0037	1.53	0.127	-.00163	.01311	25.06
SUB*	-.204843	.1032	-1.98	0.047	-.40725	-.00243	0.83
TENURE*	.158470	.0604	2.62	0.009	.04000	.27693	0.57
AGE	.000229	.0042	0.05	0.957	-.00811	.00857	49.22
EDU*	.025810	.0142	1.81	0.071	-.00216	.05379	6.22
SIZE*	-.000633	.0003	-1.72	0.085	-.00135	.00009	100.90
MEMB	-.010622	.0226	-0.47	0.639	-.05498	.03374	3.69
CREDIT*	.105945	.0606	1.75	0.081	-.01291	.22480	0.65

\* dy/dx is for discrete change of dummy variable from 0 to 1

Source: Own calculations.

Lastly, the results implied that the farm exit decision of the surveyed sample of Turkish farmers are influenced by the factors identified in the literature: agricultural subsidy, tenancy status, farm size and education level of farmers. The effect of farm size and education variables are less important compared to the agricultural subsidy and tenancy status variables. These two variables (agricultural subsidy and tenancy status) seems to be dominant factors for the Turkish farmers in deciding to leave or stay in agriculture sector.

## CONCLUSIONS

Agriculture is a sector with low income and abundant labor. Therefore, the number of

people who want to deal with farming in developed countries is decreasing. However, the food needs of people need to be met. In other words, agricultural production should be maintained. Therefore, the aim of this study is to determine the factors affecting the probability of quitting.

This study estimates the possibility of farm exits in Izmir province of Turkey and the factors affecting this decision. The factors identified as farm, family characteristics and agricultural subsidy policy. The results show that likelihood of farm exit is fully influenced by agricultural subsidy and tenancy status. The most important results is that an increase in agricultural subsidy significantly reduces the likelihood of farm exit by %20.48. In addition, we found the other two significant

variables effecting the likelihood of farm exit are farm size and farmers education level. Small farms prefer to quit farming. Also farmers with high education level may easily quit farming due alternatives in employment. According to the Agriculture and Forestry Ministry records, there is a serious decline in the number of farmers. The number of registered farmers decreased from 2.588 million in 2002 to 2.132 million in 2017. In the same period, the agricultural area cultivated by these farmers decreased from 164.96 million decares to 148.79 million decares. These reductions are the result of the agricultural policies incentives as well as the increasing gap between input and product prices. The structural problems of Turkish agriculture also have an effect on this decline. The decline in agricultural areas and the withdrawal of thousands of farmers from agriculture are alarming for the future of the country's agriculture. Therefore the Turkish government is fostering a program targeting individuals, under age 40, to become farmers since 2016.

The changing structure of Turkish agriculture has important results for productivity and efficiency. The gradual decrease in the number of farmers will affect the redistribution of resources in the agricultural sector. The low level of welfare of farmers is also effective in likelihood of farm exit. Therefore, it is necessary to take the measures to increase the welfare of farmers living in rural areas.

In addition to the support given by the Young Farmer Project, which has been implemented since 2016, additional subsidies should be given to the creation of jobs in rural areas. Especially for younger farmers, targeted programs to educate them about alternative on-farm activities should be implemented. Policy-makers also should provide programs that help farmers to integrate into the new markets easily and to promote vertical integration.

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