



## Factors determining farmers' access to agricultural credit in Turkey

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**ABSTRACT:** This study assessed the parameters determining the access of producers to agricultural credit in Turkey. This research was carried out in the production areas par excellence of the country. A total of 409 producers have been surveyed. The data collected was collected during the first quarter of 2021 and relates to the socio-economic and demographic characteristics of producers as well as the factors likely to influence their access to agricultural credit. The analysis of the results from the logistic regression model produced shows that the access of producers to agricultural credit is determined by their socio-economic and demographic characteristics. These parameters are level of education, degree of involvement in agricultural activities, social security status, household size and whether you own a tractor. Given the importance of agricultural credit for the agricultural sector; it is therefore, imperative to facilitate its access to producers.

**Key words:** agricultural credit, determining factors, logistic regression, Turkey.

## Fatores que determinam o acesso dos agricultores ao crédito agrícola na Turquia

**RESUMO:** O objetivo deste estudo é avaliar os parâmetros que determinam o acesso dos produtores ao crédito agrícola na Turquia. Esta pesquisa foi realizada nas áreas de produção por excelência do país. Foram estudados 409 produtores. Os dados foram recolhidos durante o primeiro trimestre de 2021 e estão relacionados com as características socioeconômicas e demográficas dos produtores, bem como com os fatores que podem influenciar o seu acesso ao crédito agrícola. A análise dos resultados do modelo de regressão logística produzido mostra que o acesso dos produtores ao crédito agrícola é determinado pelas suas características socioeconômicas e demográficas. Esses parâmetros são: nível de escolaridade, grau de envolvimento em atividades agrícolas, situação da previdência social, porte da família e possuir ou não trator. Dada a importância do crédito agrícola para o setor agrícola, torna-se imperativo facilitar o seu acesso aos produtores.

**Palavras-chave:** crédito agrícola, fatores determinantes, regressão logística, Turquia.

## INTRODUCTION

Efficient agriculture, processing industries and associated distribution and logistics chains are essential elements for human development (JESSOP et al., 2012). Sustainable economic and social development is based, in its early stages, on solid agriculture (BRULÉ-FRANÇOISE et al., 2016). The development of the agricultural sector alone is an important phase in a development process. However, making the agricultural sector of a state efficient necessarily involves the use of advanced technology. The use of improved technologies in agriculture is seen to increase agricultural productivity in developing countries (ASSOUTO & HOUNGBEME, 2020). In a context where agricultural production in the world and in Turkey is threatened by climate change (CHANDIO et al., 2020, CHANDIO et al.,

2021), injecting capital and defining policies to facilitate producers' access to agricultural credit could have a positive impact on the economy of the agricultural sector. According to BAHSI & CETIN (2020) then SOSSOU (2015), agricultural credit could prove to be the panacea and allow producers to transform their agriculture and boost their economy. To transform, these types of farming need to invest and, often, for lack of sufficient own resources, seek access to appropriate financial services (credit, savings, insurance, etc.) (BENNEGOUCH et al., 2016). We should therefore think of an injection of very large capital, implying a rise in agricultural credit (BRULÉ-FRANÇOISE et al., 2016).

According to FOUQUET (2014), agricultural credit is a type of finance that exclusively finances agricultural producers and is mainly used to provide finance for agricultural purposes. Indeed, according

to agricultural technicians, the credits obtained from financial services allow producers to acquire agricultural inputs in the short and medium term and agricultural equipment and materials in the long term (SNV, 2019). Thanks to these acquisitions, they can improve their production levels as well as their living and working conditions. According to AWOTIDE et al. (2015), the access of family farms to financial services including banking and microfinance services is essential to support the growth of the agricultural sector. CHANDIO et al. (2018) showed the importance of agricultural credit on wheat productivity of small farms in Sindh (Pakistan). Agricultural credit has also proven itself in France during the 20th century as a key player in the spectacular increase in agricultural production recorded (DAISY & KAIBUI, 2020). Unfortunately, farmers and rural people in developing countries have historically struggled to access credit (JESSOP et al., 2012). However, the lack of access by producers to agricultural financing destroys the ability of producers to acquire the technologies essential to the development of their agricultural activities. Several studies showed that the mismatch between supply and demand for agricultural credit is one of the reasons for low agricultural productivity in developing countries (MUSABANGANJI et al., 2015). From a financial and social standpoint, the less well-off as well as the small producers are those having more difficulty in accessing agricultural credit. Very low-income farmers, for lack of sufficient collateral, are generally excluded from formal financial services due to high transaction costs and information asymmetries that lead formal banks to be reluctant to offer them services (STIGLITZ & WEISS, 1981; AKERLOF, 1970). In addition, most poor smallholders are often unable to invest comfortably in new technologies or in the acquisition of inputs such as fertilizer, labor compensation, etc. (HIGGINS & LETURQUE, 2010; CONNING & UDRY, 2007).

Turkey's producers are not on the sidelines of these constraints. Especially in a context where the rural population is aging, agricultural production is threatened by climatic variations, production yields are in free fall and agricultural systems are in full dynamic (AKDEMIR & MIASSI, 2019); it therefore, turns out imperative to facilitate producers' access to agricultural credit. However, for religious reasons, some producers refuse to use agricultural credit. Conversely, faced with the drastic drop in production yields which induces a drop in production income, some producers fear not being able to repay the loan they have contracted and to be exposed to legal proceedings.

Socio-economic characteristics of producers such as age, household size and income are well known in the literature as parameters affecting producers' access to agricultural credit (NGUYEN & LE, 2015). LIN et al. (2019) in their study concluded that performing another activity unrelated to agriculture reduces the demand for agricultural credit in rural areas of China. Similarly, DZADZE (2012) analyzed the determinants of access to agricultural credit in Ghana using the logistic regression model. Results of the research led to the conclusion that the experience as a farmer and the level of education are factors that have a positive impact on the access of farmers to agricultural credit. OKURUT et al. (2005) also used a logit model to analyze the factors determining the demand for agricultural credit in Uganda. Factors affecting this demand include age and the level of education of the farmers. In addition, they concluded that the composition of the household, the immigration status, the sex of the farmer also impact on the needs for agricultural credit. YEHUALA (2008) noted that farmers with more experience establish much better relationships with cooperatives and other sources of formal agricultural credit, such as formal banks and nongovernmental organizations. NGUYEN & LE (2015) showed that the most important factor in farmers' access to agricultural credit in Pakistan is land ownership. According to these authors, producers with large agricultural areas have much easier access to agricultural credit.

These results obtained in both African and Asian countries are like those obtained in certain provinces of Turkey. According to HAYRAN & GUL (2018), various factors such as the farmer's age, household size, area of cultivated land, membership of a cooperative, use of agricultural advisory services and participation in an agricultural training program have an impact on the decision of the producer to use agricultural credit. These results partly corroborate those obtained by AKDEMIR et al. (2021) and YILMAZ (2010) in the province of Adana then those of EVEREST & YERCAN (2012) in the province of Çanakkale.

This study assessed the determinants of producers' access to agricultural credit. The originality of this research lies in the fact that very few studies carried out on this topic in Turkey have covered a large part of the country's production areas. As a result, the results of this study provided a much more general overview compared to previous studies.

## MATERIALS AND METHODS

The present study was carried out in Turkey, precisely among 409 producers in 9 different

provinces. 16.6% of producers operate in the provinces of Van, Muş and Bitlis. These provinces are part of the 14 largest national production zones (STAT AGRI, 2018). This thus ensures the representativeness of the sample formed. As a result, 270 producers were questioned in all these three zones (at the rate of 90 producers per province). The remaining producers were questioned in the provinces of Konya (41), Muğla (30), Karaman (21), Aksaray (18), Kütahya (15) and Elazığ (14).

The sample was formed considering all categories of producers (large, medium and small) and their production system. The surveys were carried out during the first quarter of 2021. The data collected relates to the socio-economic and demographic characteristics of producers as well as the factors likely to influence their access to agricultural credit.

The parameters determining producers' access to agricultural credit were assessed using a logistic regression model (Table 1). According to CHANDIO & JIANG (2018), logistic regression model is developed to analyze regression framework which has a binary (dependent variable). The choice of this model was based on the research of ULLAH et al. (2020), DONTSI et al., (2020), and MOUNIROU (2015). This model will make it possible to specify the existing relationships between the probability of having recourse to agricultural credit as well as its determinants. Logit models were introduced several decades ago by BOSKIN (1974) and MCFADDEN (1968) to explain the choice of an occupation from its different perspectives. This model is often used in the case of perception studies based on an econometric model for convenience. In addition, the Logit model

maintains the estimated probability between 0 and 1 (MIASSI et al., 2020).

MIASSI et al. (2020) and TENE et al. (2013) present the model by the following equation:

$$E(Y_i) = P(Y_i) = \frac{e^{\alpha + \beta X_i}}{1 + e^{\alpha + \beta X_i}} \quad (1)$$

When the producer has access to agricultural credit, the probability becomes for this purpose:

$$P(\text{no credit}) = 1 - P(Y_i) = \frac{1}{1 + e^{\alpha + \beta X_i}} \quad (2)$$

Where:

$P(Y_i)$ : The probability for a producer  $i$  to access to agricultural credit;  $P(Y_i) = 1$  if the producer access to agricultural credit and 0 if not.

$e$ : The exponential function

$Y_i$ : The explained variable; access by producers to agricultural credit,

$\beta$ : The vector of the parameters to be estimated, the sign of which allows the interpretation of the results

$\alpha$ : The constant

$X_i$ : characteristic of producer  $i$ ; it represents the vector of explanatory variables

With,

$$X = \beta_0 + \beta_1 \text{LevEd} + \beta_2 \text{InAgrSec} + \beta_3 \text{SocSec} + \beta_4 \text{HousehSiz} + \beta_5 \text{TractPos} \quad (3)$$

Where:

LevEd = Level of education, InAgrSec = Intervention in agricultural sector, SocSec = Social security, HousehSiz = Household size and TractPos = Tractor possession.

SPSS v.20 software was used as a data processing and analysis tool. It made it possible to present the socio-economic and demographic characteristics of the producers as well as to carry out the logistic regression model.

Table 1 - Variables used in the logistic regression model.

Variables	Explanation	Measurement
-----Dependent variable ( $Y_i$ )-----		
	Farmers' Access to Agricultural Credit	0 = Non 1 = Yes
-----Independent variables ( $X_i$ )-----		
$X_1$ LevEd	Level of education	0= Primary and lower level; 1= Secondary level; 2= University level
$X_2$ InAgrSec	Intervention in agricultural sector	0 = Non 1 = Yes
$X_3$ SocSec	Social security	0 = Non 1 = Yes
$X_4$ HousehSiz	Household size	In number
$X_5$ TractPos	Tractor possession	0 = Non 1 = Yes

## RESULTS AND DISCUSSION

### *Socio-economic and demographic characteristics of the producers*

The average age of producers is 47 years old (Table 2). These statistics are identical to those obtained by KUSEK et al. (2017). Mostly male, the producers have social security (76.5%) and make agricultural production their main activity (73.1%). Most of the producers have an education level lower than or equal to the primary education level. This result is close to that of the research by TAPKI et al. (2021). Rural households have an average of 8 members. Those with an average of 7 are the most dominant (53.7%). After this category, follows that composed of 1 to 5 people (43.3%). 69.5% of producers own tractors. As a result, 24.4% use an external workforce. According to KORMAWA et al. (2019), owning a tractor reduces the need for external labor.

### *Producers' access to agricultural credit*

In Turkey, producers use two forms of agricultural credit: informal credit and formal credit. Informal credit as financial support received from a relative or a third party to finance rural activities. Formal credit is a loan of money received from a legally registered financial institution with the required accreditation. These are banks, microfinance institutions, producer cooperatives, etc. Based on our survey results, 33.6 % of the producers surveyed use informal credit. To cover production costs, 66.4 % of producers report that they make loans from Ziraat Bank (93.6%) or Tarım Kredi (5.4%). The rest of the producers (1%) resort to other local financial institutions. According to these producers, Ziraat Bank and TarımKredi offer the best services in terms of loans to producers. This result corroborated with that obtained by AKDEMİR et al. (2021).

According to AKDEMİR et al. (2021), banks and microfinance institutions are the ones

Table 2 - Socio-economic and demographic characteristics of respondents.

-----Variable-----	Percentage	Mean	
Age	0-30	8.6	26.0
	31-60	81.1	48.0
	More than 61	10.3	67.4
	Total	100.0	47.1
Sex	Male	99.0	-
	Female	1.0	-
	Total	100.0	-
Social security	Yes	76.5	-
	No	23.5	-
	Total	100.0	-
Household size	1-5	43.3	4.0
	6-10	53.7	7.3
	More than 10	3.0	13.3
	Total	100.0	8.2
Level of education	Primary and lower level	53.8	-
	Secondary level	37.3	-
	University level	8.9	-
	Total	100.0	-
Intervention in agricultural sector	Yes	73.1	-
	No	27.9	-
	Total	100	-
Tractor possession	Yes	69.5	-
	No	30.5	-
	Total	100.0	-
Use of external labor force	Yes	24.4	-
	No	75.3	-
	Total	100.0	-

Source: Survey result, 2021.



offering the best services. According to this same source, Ziraat Bank and TarımKredi are the entities offering the best services to producers (Figure 1).

The regression model identified and / analyzed the parameters determining producers' access to agricultural credit is statistically significant. The  $R^2$  obtained being equal to 0.914; we can therefore, deduce that the variables introduced into the model determined at 91.4% the access of producers to agricultural credit in Turkey. The analysis of the results obtained showed that the access of producers to agricultural credit is determined by their socio-economic and demographic characteristics. These included education level, degree of involvement in farming activities, social security status, household size and whether he owns a tractor (Table 3).

The level of education has a negative and statistically significant effect at the 1% level on producers' access to agricultural credit. This result does not corroborate with that obtained by SEDEM et al. (2016). An increase of one unit of the level of education will; therefore, induce a reduction by 70.8% in the producer's access to agricultural credit. As a result, the more educated the producer, the less access he has to agricultural credit. The most educated producers have a university level. Most of them are executives working in the public or private sectors and have other sources of income to finance their production. These producers have made agricultural production a secondary activity and work in urban and peri-urban areas of Turkey. The latter have very little information

on the opportunities for access to agricultural credit submitted by agricultural technicians in rural areas. This explains the result obtained.

The variable "intervention in the agricultural sector" impacts positively and significantly at the 1% level the access of producers to agricultural credit. This result allowed us to deduce that producers who make agricultural production their main activity are more likely to contract agricultural credit. An increase of one unit on this variable will therefore increase by 136.70% in the producer's access to agricultural credit. Indeed, agricultural production is a capital-intensive industry (DELAIRE et al., 2011). This ranges from tillage activities to harvest. Since rigorous monitoring of technical production routes is a determining parameter of production output (KABORE, 2014), producers whose main source of income is agriculture, must therefore follow technical production routes to obtain good yields and making significant income. This forces them to resort to agricultural credit to meet the demands of the crop. Producers who do not make agricultural production their main activity mostly produce for consumption and sell surplus production. The latter generally produce on a small scale and therefore do not feel the need to take out credit for their production.

Social security status has a positive and significant effect at the 5% level on producers' access to agricultural credit. This result allows us to deduce that producers who have not subscribed to social insurance are more willing to take out agricultural

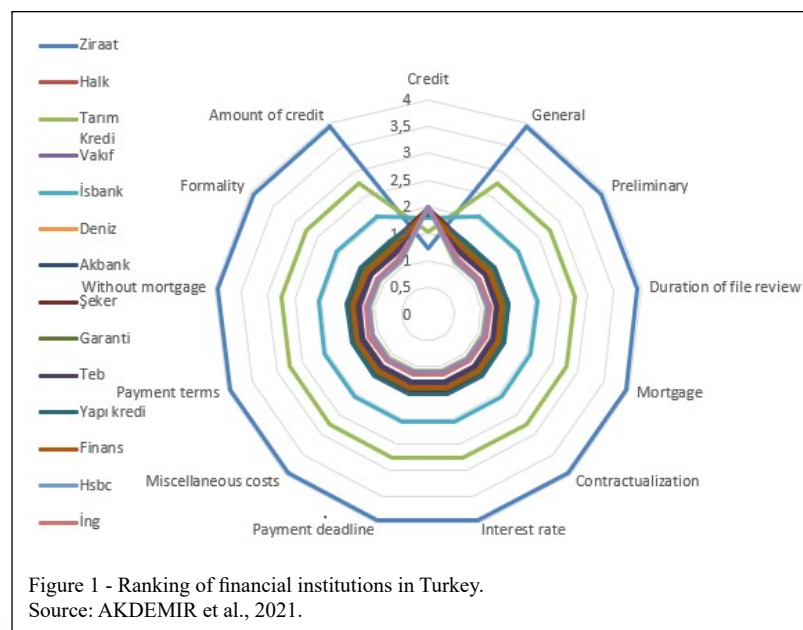


Table 3 - Estimation of the logistic regression model.

Variable	Coefficient	Std error	Wald statistic	P
Constant	0,532	0,196	7,358	0,007***
X <sub>1</sub> LevEd	-0,708	0,235	9,078	0,003***
X <sub>2</sub> InAgrSec	1,367	0,396	11,902	0,001***
X <sub>3</sub> SocSec	0,961	0,408	5,542	0,019**
X <sub>4</sub> HousehSiz	-1,241	0,209	35,377	0,000***
X <sub>5</sub> TractPos	0,532	0,196	7,358	0,007***
Number of observations = 409				
Prob > chi2 = 0.0000 ***				
Pseudo R2 = 0.914				

\*\*\*: significant at the 1% (P < 0.01); \*\*: significant at 5% (0.01 < P < 0.05); \*: Significant at 10% (0.05 < P < 0.10).  
Source: Results of estimates made with SPSS.

credit. An increase of one unit in this variable will therefore increase by 96.1% in the producer's access to agricultural credit. Social security is insurance paid by any individual who wishes to have their medical expenses covered in the event of illness (CIT, 2001). These costs are fixed depending on the type of insurance chosen and are not refundable. Producers in rural and urban areas of Turkey are mostly small and medium-sized producers; apparently to the middle social class or to that of the less well-off. Although, concerned about their state of health and aware of the fact that taking out insurance does not allow them to make direct profits, they prefer to invest their financial assets in their farm.

The "household size" variable has a negative and significant impact at the 1% threshold on producers' access to agricultural credit. This result does not corroborate with that obtained by ZULFQAR et al. (2021). An increase of one unit of the household size will therefore induce a reduction by 124.10% in the producer's access to agricultural credit. As a result, the larger the size of the producer's household, the less willing he is to take out agricultural credit. Indeed, labor power is essential in agriculture for the execution of the technical production route. This force can be manual or mechanical. It intervenes throughout the production. This ranges from tillage activities to harvest. Producers whose household size is small are therefore forced to resort to an outside labor force, which generates significant costs. This category of producers generally uses agricultural credit to meet the costs associated with the acquisition of labor. According to SOSSOU (2015) then MIASSI & DOSSA (2018), agricultural credit allows producers to meet the expenses of the farm. As for producers

with a large household size, they prefer to organize the unfolding of family activities to limit the use of any external force.

The possession or not of a tractor has a positive and significant effect at the 1% threshold on the producer's access to agricultural credit. This result corroborated with that obtained by AKDEMIR et al., 2019. An increase of one unit in this variable will therefore increase by 53.20% in the producer's access to agricultural credit. This is partly in line with the previous conclusion and makes it possible to deduce that producers who do not have tractors are more willing to resort to agricultural credit. Tractors are used in agriculture to provide the mechanical energy needed to perform soil tillage, for example (APCA, 2013). Producers who do not have tractors are therefore forced to hire or use manual labor. Which generates costs. This justifies the recourse of producers who do not have tractors to agricultural credit.

## CONCLUSION

The agricultural sector is one of the important pillars of the Turkish economy. However, in recent years, this sector has been threatened by several parameters, including climatic variations, declining soil fertility and the aging of the population accentuated by rural exodus. Being a vicious circle, these parameters induce a drastic drop in production yields and, in turn, a drop in production income. Faced with these constraints, several studies identified agricultural credit as the panacea. To this end, this study assessed the determining factors of producers' access to agricultural credit in Turkey. The analysis of the results obtained showed that the access of

producers to agricultural credit is determined by their socio-economic and demographic characteristics. These are mainly the level of education of the producer, the degree of involvement in agricultural activities, social security status, household size and whether they own a tractor. As agricultural credit is considered a lever for the development of the agricultural sector; it is therefore, important to take these parameters into account to define agricultural policies facilitating producers' access to agricultural credit.

## DECLARATION OF CONFLICT OF INTEREST

The authors declare no conflict of interest. The founding sponsors had no role in the design of the study; in the collection, analysis, or interpretation of the data; in the writing of the manuscript, and in the decision to publish the results.

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