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Determining Factors Affecting Agricultural Credit Demand: A Research in Erzurum Province, Türkiye

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ABSTRACT

The purpose of this research is to identify the variables that might influence the demand for low-interest business and investment loans given to Türkiye livestock and agricultural industries. A face-to-face survey of 384 producers who go on with their production operations in ten distinct Erzurum districts provided the data utilized in the study. Binary logistic regression analysis was used to identify the factors influencing credit use. The data shows that producers in the age groups of 20–30 are less likely to utilize credit than those in the 31–45 and 46–60 age groups. Credit use is higher among individuals involved in mixed production activities than in crop production only. Individuals who report being in excellent health have a higher likelihood of using credit than those who report being in bad health. Having a house of one's own increases the likelihood of using credit. Those whose production activity location is close to the district center are more likely to use credit. It has been shown that people are more likely to utilize if they say the guarantees that loan providers want are inexpensive, if they say they will carry on with their production, and if they say they are happy with the amount of expertise needed for production.

Keywords: Agricultural credit, Logistic regression, Marginal effect, Türkiye

1. Introduction

Agricultural and animal production is frequently mentioned as an indispensable sector for reasons such as people's survival, social development, providing input to other sectors and contributing to employment (Zhao et al. 2008; Ma et al. 2019; Bahşi & Çetin 2020; Wang et al. 2023). The health of this sector has significant impacts on the nation's key macroeconomic goals, such as job creation, poverty reduction, human resource development, and food security (Quddus & Kropp 2020). Due to economic factors, climatic conditions, decreasing soil quality, land fragmentation, etc., some limitations in production may be encountered and may constitute an obstacle to sustainability in agriculture. It implements support policies in order to increase the income of economic units operating in the agricultural sector, to protect consumers, to improve the production structure, to increase production, to increase efficiency and to mitigate or prevent fluctuations in agricultural product prices (Tuna 2011).

Agricultural support policies differ according to the level of development and needs of countries. According to the Organization for Economic Cooperation and Development (OECD), agricultural support policies implemented in Türkiye include direct payments to producers, high or low price applications in product prices, tax reductions and discounted credit applications, development of agricultural infrastructure, training, information production, distribution of information, etc.

In order to reduce the negative impact of dependency due to economic and other factors, the state in Türkiye provides subsidized business and investment loans to producers engaged in agricultural and animal production activities. Agricultural credit is an important factor in the development of the production and investment structure of the agricultural sector in both developed and developing countries and is an important instrument of agricultural development (Adanacioğlu et al. 2017). Financial support plays a critical role in facilitating sustainable growth and development of agricultural enterprises. Access to adequate and affordable financing is essential for farmers and agribusinesses to invest in modern technologies (Musagaliev & Dustova 2023). The literature on the impact of agricultural credit on producer income and output recognizes that producers' access to credit is important in agriculture (Akram et al. 2013; Ekwere & Edem 2014; Udoka et al. 2016; Nadolnyak et al. 2017; Amanullah 2019; Sagbo & Kusunose 2020; N.Anh et al.2020; Moahid et al. 2021; Novotná & Kočišova 2022; Hutchins 2023).

The aim of the study is to determine the economic and socio-demographic factors that may affect the demand of these loans extended to producers in order to support agricultural production and reduce the impact of economic, climatic, etc. dependency, as well as business characteristics by logistic regression analysis. The data used in the study were obtained through a face-to-face survey conducted to the producers who continue their production activities in 10 districts of Erzurum. A total of 384 producers were surveyed through random sampling and Binary Logistic Regression analysis was performed with the data obtained and marginal effects were examined. The literature study on the factors affecting agricultural credit demand is given in Table 1.

Table 1- Literature Review

Authors	*Data-Method*	*Analysis Method*	*Conclusion*
Katchova (2005)	2001 Agricultural Resource Management study data were used.	Probit Model	Farm income, business management strategies, age and risk aversion were found to affect the probability of using credit.
Oluwasola & Alimi (2008)	Data collected from a survey of 270 producers was used.	Tested with exponential regression models.	Interest rate, farm expenditures, farm size and savings are found to be the main determinants of loan demand.
Mpuga (2010)	Household survey data from 1992-93 and 1999-2000 were used.	Probit, Tobit and Multinominal Logit	It has been determined that educated and young producers are more likely to request loans, while female producers have lower credit requests and amounts.
Nouman et al. (2013)	Data were collected using a questionnaire administered to 80 respondents.	Ordinal Logistic Regression	Credit utilization was found to be significantly affected by marital status, farm size and education level.
Cheng and Ahmed (2014)	Data collected through a questionnaire survey of producers in four different districts were used.	Probit Model	Poor households and older age level are found to increase the likelihood of applying for loans from informal sources.
Ijioma and Osundu (2015)	Data were obtained through a questionnaire administered to 90 producers through random sampling.	Multiple Regression	Age, household size, cooperative membership, marital status, education level, enterprise size and total loans repaid were found to have an impact on credit utilization.
Fecke et al. (2016)	Data from the German Development Bank consisting of 68 430 observations covering the years 2010-2014 were used.	Ordinary Least Squares (OLS)	It has been determined that the interest rate has a negative effect on the demand for loans, and grace periods, gross value added in agriculture and job expectations have a positive effect on the demand for loans.
Asante-Addo et al. (2017)	Data were obtained through a questionnaire survey of approximately 150 producers.	Probit Model	Savings, membership in farmer organizations, and education of the household head were found to positively affect participation in credit programs.
Umanath et al. (2018)	National Sampling Survey data for 2012-2013 were used.	Heckman Sample Selection Model	Enterprise size, age, and having a credit or debit card increase the likelihood of accessing agricultural credit.
Ogundeji et al. (2018)	The data were obtained through a questionnaire administered to 100 farmers.	Probit, Tobit	Savings, scale of production, membership in farmers' associations and financial record keeping have a positive effect on access to credit, while high interest rates have a negative effect.
Hayran & Gül (2018)	239 farmers were surveyed with a questionnaire.	Binary Logistic Regression	Household size, cultivated planted area, cooperative membership positively affected agricultural credit use, while the variables of farmer's age, whether or not he/she received agricultural consultancy and the number of agricultural training programs attended in the last year negatively affected agricultural credit use.
Vovchak et al. (2018)	Sector data	Correlation-regression analysis	The demand for bank loans by small and medium-sized agricultural enterprises is largely driven by low interest rates.
Qin et al. (2019)	342 producers were surveyed and data were collected.	Heckman Two Stage Model	Cost of production, non-working family members, income level, and guarantee group membership were found to increase the use of microcredit.
Silong & Gadanakis (2019)	216 producers were surveyed and data were collected.	Logit Model	Education, group membership, household size and gender are found to be effective on loan demand.
Ofori et al. (2019)	The data were obtained through a questionnaire survey of 209 producers by stratified random sampling method.	Treatment Effect, Propensity Score Matching	Membership in a cooperative has no effect on agricultural income, value and quantity of agricultural inputs, but membership affects access to credit services and choice of technology.

Table 1- Literature Review (Continued)			
Lin et al. (2019)	2013 Household Finance survey data were used.	Probit Model	Age, family size, non-agricultural income, education level and informal borrowing were found to be effective on credit constraints.
Dang et al. (2019)	Data from 206 producers were used.	Multinomial Logit regression	Collateral was identified as the most important barrier to accessing formal credit.
Kumar et al. (2020)	Data from the National Survey Office's Debt and Investment Survey were used.	Cragg's Model	It has been determined that assets, land size, education level of the head of the family and gender have an effect on access to corporate credit.
Ullah et al. (2020)	In 2017, data were obtained through a survey of 395 randomly selected producers.	Binary Logistic Regression	A positive relationship was found between farm size, monthly income, access to information and asset status and credit utilization.
Khanal & Omobitan (2020)	Data were obtained through a survey of 104 producers using stratified random sampling.	Probit Model	Gender, off-farm work, amount of land owned, farm expertise, internet and smartphone use were found to have an effect on credit constraint.
Moahid & Maharjan (2020)	292 farmers were surveyed and data were obtained through a questionnaire.	Probit Model	It has been determined that crop diversity, education, number of adults in the household, and business size positively affect the demand for loans.
Hu et al. (2020)	Data were collected from 1422 producers through a questionnaire survey.	Probit Model	Collateral status, courage for credit, business type (sole proprietorship-company) were found to be factors affecting credit constraints. Gender, age and marital status are not effective on credit constraints.
Toure (2021)	In 2019, data was obtained through a survey conducted with 400 producers.	Logistic Regression	Access to credit, quantity of cotton sold, total area planted, quantity of other crops and sale price were identified as the factors that led to income growth.
Ojo et al. (2021)	Data were collected through a questionnaire survey of 183 producers from four provinces covering the years 2017-2018.	Probit Model	Location, education and drought experience were identified as factors affecting access to credit.
Lazaro & Alexis (2021)	Data collected from 300 producers identified through multi-stage sampling were used.	Binary Logistic Regression	Factors such as age, gender, education, household size, distance, awareness, and collateral were found to be determinants of credit demand.
Kahramanoğlu (2021)	153 producers were surveyed with a questionnaire.	Chi-square test	A significant relationship has been found between the increase in education, openness to innovations and following economic developments and turning to private banks.
Kuhn & Bobojonov (2021)	Life in Kyrgyzstan (LIK) dataset covering the years 2013-2016 is used.	Logit, Least Squares	The risk of credit default and the possibility of collateral loss are demand-side policies that prevent producers from applying for loans. Supply-side factors such as real credit constraints and demand for collateral significantly affect credit utilization ratios and loan amounts.
Manogna & Mishra (2022)	Survey data from the National Sample Research Office between 2012 and 2013.	Tobit Model	There is a positive relationship between producers' asset status, enterprise size and access to credit.
Gong & Elahi (2022)	Household Finance Survey (CHFS) data were used.	Propensity Score Matching, Benchmark Regression	It is stated that land transfer decreases the demand for credit, while the previous year's production amount positively affects the demand for credit. Age has a negative effect on utilization of agricultural credit.
Behera A. & Behera M. (2022)	Data was collected from 475 producers through a questionnaire survey.	Logit Model	Factors such as collateral problems, low awareness of farmers, low level of education, lack of financial institutions in villages, etc. were identified as constraints faced by farmers.
Wongpit & Sisengam (2022)	In 2019, data from a nationwide household survey was used.	Logit Model	Household size has a negative relationship with access to credit, household income has a negligible effect on credit demand, while savings has a positive effect.

2. Material and Methods

2.1. Data

The sampling framework of the research consists of producers in 10 different districts determined by random sampling method in Erzurum. These districts are Aziziye, Yakutiye, Palandoken, Aşkale Pasinler, Tekman, Karayazı, Horasan, Narman and Tortum, as seen in Figure 1. The data set in the research was obtained in 2023 through a face-to-face survey of producers engaged in agriculture and animal husbandry in these districts. During the meetings with the Erzurum Provincial Directorate of Agriculture, it was informed that a total of 28 594 producers were operating in the districts determined during the period to be surveyed.

Figure 1- Erzurum Province Sampling Frame (Google Earth 2023)

The following formula was used to determine the size of the sample mass to be surveyed.

$$n = \frac{\mathrm{NPQ}Z^2}{(N-1)d^2 + \mathrm{PQ}Z^2} \quad (1)$$

In this formula, n = Sample mass size, N = Acatch volume (number of producers operating in 10 districts), P = Rate of agricultural credit utilization, Q = Rate of non-use of agricultural credit (1-P), Z=(1-α) Z test value at level, α = Level of significance, d = Margin of error (tolerance) (Özer 2004).

Sample size after making the necessary calculations in the formula,

$$n = \frac{28594(0{,}5)(0{,}5)(1{,}96)^2}{(28594-1)0{,}05^2 + (0{,}5)(0{,}5)(1{,}96)^2} \cong 380$$

calculated as. A total of 384 survey data and binary logistic regression analysis were performed to examine the marginal effects. The distribution of the data obtained by districts is given in Table 2.

Table 2- Distribution of Participants by Districts

Districts	*Frequency*	*Percentage*
Aşkale	41	10.7
Aziziye	45	11.7
Palandöken	30	7.8
Yakutiye	36	9.4
Pasinler	54	14.1
Narman	31	8.1
Tekman	37	9.6
Horasan	37	9.6
Karayazı	39	10.2
Tortum	34	8.9
Total	384	100.0

2.2. Measures and variables

The dependent variable of the study is "Do you have subsidized agricultural loans?" It is a two-category (yes-no) answer variable to the question. These categories are defined with "0" if there is agricultural credit, and "1" if there is no agricultural credit. Independent variables are defined as dummy variables in order to measure the effects of their categories on the dependent variable; age (20-30, 31-45, 46-60 and 60+), number of people in the household, level of education, status of employment in another activity (no, yes, retired), field of production activity (vegetable, animal and mixed), market connection status (yes, no), state of health (good, bad), the idea that credit conditions are difficult (disagree, undecided, agree), opinion on whether the loan is advantageous or not (is it advantageous? / disagree, undecided, agree), presence of personal loans (yes, no), annual income (0-50 thousand TL, 51-100 thousand TL, 101-150 thousand TL, 151-200 thousand TL, 200 thousand TL+), Distance of the activity location from the district center (0-20 km, 21-30 km, 31+ km), use of mobile or internet banking (yes, no), credit card ownership (yes-no), his opinion about the affordability of the collateral level required for the loan (disagree, undecided, agree), the idea that the loans used will increase income(disagree, undecided, agree), the idea that I will continue production in the future (I disagree, I'm undecided, I agree), degree of satisfaction with the level of knowledge required for production (dissatisfied, satisfied), they are variables measured on ordinal and nominal scales, such as the level of satisfaction with the income obtained (I am not satisfied, I am satisfied).

2.3. Research methodology

With the data obtained from the producers in the survey application areas, frequency analyzes were first made in the SPSS 20 Package program. Then, chi-square independence tests, which are frequently used in practice, were performed to determine the relationship between the dependent variable and the independent variables. The dependent variable is the binary response variable expressing the credit utilization status. If the dependent variable is a binary response variable (yes-no), binary logistic regression analysis is used to examine the cause and effect relationship between the dependent variable and independent variables (Agresti 1996). Finally, binary logistic regression analysis was performed in the Stata 15 package program with the variables subjected to chi-square independence test and marginal effects and factors affecting agricultural credit demand were determined.

3. Results

3.1. Descriptive statistics and chi-square test

Business characteristics, credit-related considerations, socio-demographic and economic factors that may be effective in agricultural loan demand are shown in Table 3.

The share of producers using subsidized loans by age group was 8.3% for 20-30, 18.2% for 31-45, 20.8% for 46-60 and 5.2% for 61+. The share of producers working in another job and using loans in the total is 8.3%, the share of those working in another job but using loans is %39.8 and the share of retired people is 13.2%. The share of those engaged in crop production and using credit is 4.9%, the share of those engaged in animal production is 15.9%, and the share of those engaged in mixed production activities is 31.8%. The share of those who have a market connection in production activities and use credit in the total is 6.4%, while the share of those who do not have a market connection is 45.3%. The share of producers in good health who utilized loans was 39.3%, while the share of those in poor health was 13.3%. The share of those who own a house in the province or district and use a loan in the total is 17.2%, while the share of those who do not own a house is 35.4%.

The share of producers who used credit and disagreed that the conditions were difficult was 4.4%, the share of those who were undecided was 20.6% and the share of those who agreed was 27.6%. The share of producers who do not agree that the loans are advantageous and use loans is 15.1%, the share of those who are undecided is 16.9% and the share of those who agree is 26.6%. The share of those who disagree with the statement "Loans increase income" and use loans is 14.8%, the share of those who are undecided is 20.6%, and the share of those who agree is 17.2%. The share of those who disagree with the statement "I will continue production in the future" and use credit is 6.5%. The share of those who are undecided is 1.6% and the share of those who agree is 6.6%. The share of producers who agree with the statement "The required guarantees are suitable" and use loans is 22.1% in the total.

The share of borrowers with an annual income between TL 0-50 thousand is 3.9%, TL 51-100 thousand is 14.3%, TL 101-150 thousand is 12.8%, TL 151-200 thousand is 10.9% and TL 201 and above is 5.5%. The share of producers who have personal loans and use loans in the total is 6%, while the share of those who do not have a loan is 46.6%. The share of those who stated that the distance of the production activity location to the district center is 0-20 km and used credit is 27.9%, those whose distance is 21-30 km is 12.2% and those whose distance is 31 km + is 12.5%. The share of those who use mobile/internet banking and take out loans in the total is 34.1%, and the share of those who do not use it is 18.5%. The share of those who are not satisfied with their knowledge and use loans is 23.4%, while the share of those who are satisfied and use loans is 29.2%. While the share of those who are not satisfied with their income and use loans in the total is 34.1%, the share of those who are satisfied is 18.5%.

According to the chi-square independence test results in Table 3, the variables of working in another activity, having a personal loan and distance to the district center were not found to be significant. There is a significant relationship between all other variables and credit utilization status.

Table 3- Descriptive statistics and chi-square test results

Variables		*Subsidized Loan Utilization Status*		*n (%)*	X2	*P*
		Yes	*No*			
Age	20-30 age group	32(8.3)	3(0.8)	35(9.1)	33.940	0.000 [a]
	31-45 age group	70(18.2)	84(21.9)	154(40.1)		
	46-60 age group	80(89.4)	90(80.6)	170(6.5)		
	61 and above	20(13.2)	5(11.8)	25(25)		
Working status in another activity	No	153(39.8)	149(38.8)	302(78.6)	2.305	0.316
	Yes	32(8.3)	23(6)	38(14.3)		
	Retired	17(4.4)	10(2.6)	27(7)		
Production activity	Herbal	19 (4.9)	3(15.6)	22(5.7)	17.358	0.000[a]
	Animal	61(15.9)	38(9.9)	25.8(99)		
	Mixed	122(31.8)	141(36.7)	263(68.5)		
Is there a market connection?	Yes	28(6.4)	59(5.6)	87(22.7)	18.813	0.000[a]
	No	174(45.3)	123(32)	297(77.3)		
Health status	Good	66(39.3)	131(43.8)	319(83.1)	20.983	0.000 [a]
	Bad	51(13.3)	14(3.6)	65(16.9)		
Housing ownership status	Yes	66(17.2)	131(34.1)	197(51.3)	59.202	0.000 [a]
	No	136(35.4)	51(13.3)	187(48.7)		
The conditions to use the loan are difficult	Disagree	17(4.4)	116(30.2)	133(34.6)	158.962	0.000[a]
	Undecided	79(20.6)	1(0.2)	80(20.8)		
	I agree.	106(27.6)	65(16.9)	171(44.5)		
Subsidized loans are advantageous	Disagree	58(15.1)	38(9.9)	96(25)	77.337	0.000[a]
	Undecided	65(16.9)	3(0.8)	68(17.7)		
	I agree.	79(20.6)	141(36.7)	220(57.3)		
Do you have consumer credit?	Yes	23(6)	14(3.6)	37(9.6)	1.500	0.146
	No	179(46.6)	168(43.8)	347(90.4)		
Annual income status	0-50 thousand TL	15(3.9)	53(13.8)	68(17.7)	65.863	0.000[a]
	51-100 thousand TL	55(14.3)	102(26.6)	157(40.9)		
	101-150 thousand TL	49(12.8)	30(7.8)	79(20.6)		
	151-200 thousand TL	42(10.9)	13(3.4)	55(14.3)		
	201 thousand and above TL	21(5.5)	4(1)	25(6.5)		
Distance to district center	0-20 km	107(27.9)	111(28.9)	218(56.8)	2.549	0.280
	21-30 km	47(12.2)	34(8.9)	81(21.1)		
	31 and above km	48(12.5)	37(9.6)	85(22.1)		
Mobilbank/internet use case	Yes	131(34.1)	165(43)	296(77.1)	36.098	0.000 [a]
	No	71(18.5)	17(4.4)	88(22.9)		
Credit card usage status	Yes	78(20.3)	133(34.6)	211(54.9)	45.934	0.000 [a]
	No	124(32.3)	49(12.8)	173(45.1)		
The required collateral is affordable	Disagree	85(22.1)	109(28.4)	194(50.5)	120.893	0.000 [a]
	Undecided	95(24.7)	1(0.3)	96(25)		
	I agree.	22(5.7)	72(18.8)	94(24.5)		
Loans boost income	Disagree	57(14.8)	42(10.9)	99(25.8)	84.297	0.000 [a]
	Undecided	79(20.6)	7(1.8)	86(22.4)		
	I agree.	66(17.2)	133(34.6)	199(51.8)		
Will you continue production in the future?	Disagree	25(6.5)	8(2.1)	33(8.6)	7.764	0.021 [b]
	Undecided	6(1.6)	6(1.6)	12(3.1)		
	I agree.	171(44.5)	168(43.8)	339(88.3)		
Satisfaction with the level of knowledge required for production	Not Satisfied	90(23.4)	39(10.2)	129(33.6)	22.952	0.000 [a]
	I am satisfied	112(29.2)	143(37.2)	255(66.4)		
Satisfaction with your income	Not Satisfied	131(34.1)	64(16.7)	195(50.8)	33.758	0.000 [a]
	I am satisfied	71(18.5)	118(30.7)	189(49.2)		
Education Status					12.305	0.091 [c]
Number of people in the household					19.352	0.007 [a]

[a]P<0.01; [b]P<0.05; [c b]P<0.1

3.2. Model of estimation

In the study, there should be no multiple linear connections between the independent variables to be included in the model. Therefore, the multicollinearity test results performed before the model was established are given in Table 4. Those with a Variance Magnification Factor (VIF) value of 10 and above indicate a high level of multilinear connection, and those greater than 5 indicate a moderate level of multilinear connectivity (Alkan & Demir, 2009). It can be stated that there is no multicollinearity between the variables.

Table 4- Multicollinearity results for independent variables

Independent Variables	*VIF*	*1/VIF*
Age	1.60	0.627
Do you work in a job other than agricultural activity?	1.27	0.788
What is your production activity?	1.20	0.834
Do You Have a Market Connection at the Point of Sale of the Product?	1.29	0.766
Your health status?	1.26	0.791
Residential ownership status?	1.43	0.700
The requirements for obtaining a subsidized loan are difficult	1.34	0.746
Subsidized loans are advantageous	1.36	0.736
Do you have a personal loan?	1.29	0.774
Your annual income?	1.74	0.575
Distance of the place of production activity to the district center	1.14	0.879
Mobile/Internet banking use case	1.62	0.618
Your credit card usage status?	1.69	0.592
The required guarantees are at a level that can be met	1.14	0.874
Loans increase income	1.44	0.697
I will continue production in the future	1.12	0.890
Are you satisfied with the level of knowledge required for production?	1.14	0.876
Educational background	1.46	0.687
Number of people in the household	1.12	0.890
Mean VIF	1.35	

The estimated Binary logistic regression model estimation results and OR values are given in Table 5.

Binary logistic regression is not concerned with estimating the value of the dependent variable. Instead, the probability of the dependent variable taking the value 1 is estimated. (Alpar 2013). The dependent variable is the nominal variable "do you have subsidized loans (yes-no)?". For regression analysis, it was coded as yes=0, no=1. The results will be interpreted according to category 1 of the dependent variable.

According to binary logistic regression analysis, when OR <1, the factor of interest (relative to the reference) has little effect on the investigated situation. When OR >1, it has an increasing effect compared to the reference group (Alkan & Demir, 2019). As a result of the analysis, producers aged between 31-45 (OR 0.191; 95% CI = -3.303-0.003) and producers aged between 46-60 (OR = 0.126; 95% CI = -3.850 -0.291), 20-30 The odds ratio of not using credit is lower compared to producers in the age group between. According to the field of production activity, the odds ratio of producers engaged in mixed production (vegetable + animal production) (OR = 0.096; 95% CI = -4.111 -0.629) of not using credit is lower than the producers engaged in only plant production activities. Farmers with poor health status (OR=3.88; 95% CI= 0.218-2.497) have a higher odds ratio of not using credit than farmers with good health status. Producers who do not own a house in the city or district (OR=4.50; 95% CI=0.642-2.367) have a higher odds ratio of not using credit than producers who own a house. Manufacturers who are undecided about whether the credit conditions are difficult (OR=55.11; 95% CI= 1.532-6.485) and manufacturers who agree with the statement that the conditions are difficult (OR=6.56; 95% CI=0.973-2.789) have a higher odds ratio of not using credit than those who disagree with the statement that the credit conditions are difficult. Producers whose production location is 21-30 km away from the district center (OR=2.69; 95% CI=0.043-1.935) have a higher odds of not using credit than producers whose distance to the district center is 0-20 km.

Farmers who are undecided about whether the required collaterals are affordable (OR=92.33; 95% CI= 2.010-7.040) have a higher odds ratio of not using credit than those who disagree with the statement that the collaterals are affordable. Producers who are undecided whether to agree or not with the statement that they will continue production in the future (OR = 0.051; 95% CI = -5.825 -0.114) have a lower odds ratio of not using a loan than those who do not agree with this statement. Producers who are satisfied with the level of information required for production (OR = 0.415; 95% CI = -1.664 -0.091) have a lower odds ratio of not using credit than producers who are not satisfied with the level of information.

Table 5- Binary logistic regression analysis estimation results

Variables	*β*	*Standard Error*	*z*	*P>|z|*	*OR*	*[95% Conf. Interval] Lower Limit*	*Upper Limit*
Age (reference: 20-30)							
31-45 age group	-1.653316	0.841607	-1.96	0.049 [b]	.1914142	-3.302834	-0.0037969
46-60 age group	-2.070552	0.907934	-2.28	0.023 [b]	.1261162	-3.85007	-0.2910339
61 and above age group	-2.342141	1.395474	-1.68	0.093 [c]	.0961216	-5.07722	0.3929372
Work other than agricultural activities (reference: yes)							
No	0.324871	0.566381	0.57	0.566	1.383851	-0.7852158	1.434957
Retired	-0.837973	1.021333	-0.82	0.412	.4325864	-2.839748	1.163802
Production activity (reference: Herbal)							
Animal	-1.493949	0.928859	-1.61	0.108	.2244845	-3.314479	0.3265816
Mixed	-2.370258	0.888343	-2.67	0.008 [a]	.0934566	-4.111379	-0.6291374
2.market connection (reference: yes)	-.225045	0.50873	-0.44	0.658	.7984799	-1.222137	0.7720464
2.Your state of health (reference: good)	1.357852	0.581484	2.34	0.02 [b]	3.887833	0.2181652	2.497539
2.Housing ownership status (reference: yes)	1.504761	0.440103	3.42	0.001 [a]	4.503076	0.6421739	2.367348
Difficult credit conditions (reference: disagree)							
Undecided	4.009355	1.263608	3.17	0.002 [a]	55.1113	1.532728	6.485981
I agree	1.881261	0.463257	4.06	0.000 [a]	6.561772	0.9732934	2.789228
Loans are advantageous (reference: disagree)							
Undecided	-0.339069	1.107351	-0.31	0.759	.7124333	-2.509437	1.831299
I agree	-0.503324	0.451455	-1.11	0.265	.604518	-1.38816	0.381512
2.Consumer credit ownership (reference: yes)	-1.090707	0.694268	-1.57	0.116	.3359788	-2.451447	0.2700331
Annual income (reference: 0-50 thousand TL)							
51-100 thousand TL	0.143986	0.590416	0.24	0.807	1.154868	-1.013207	1.301179
101-150 thousand TL	0.109334	0.701614	0.16	0.876	1.115535	-1.265804	1.484472
151-200 thousand TL	-0.210328	0.81709	-0.26	0.797	.8103188	-1.811795	1.39114
201 thousand TL above	-1.175955	1.03762	-1.13	0.257	.3085241	-3.209653	0.8577428
Distance to district center (reference: 0-20 km)							
21-30 km	0.989734	0.482546	2.05	0.04 [b]	2.690518	0.0439615	1.935506
31 above km	-0.803263	0.530343	-1.51	0.13	.4478651	-1.842717	0.2361907
2. Mobile/Internet banking usage status (reference: yes)	1.017386	0.576562	1.76	0.078 [c]	2.765955	-0.1126536	2.147426
2.Credit card usage status (reference: yes)	0.416806	0.431603	0.97	0.334	1.517109	-0.4291197	1.262733
The required collateral is affordable (reference: disagree)							
Undecided	4.525408	1.283169	3.53	0.000 [a]	92.33358	2.010442	7.040374
I agree	-0.431994	0.468239	-0.92	0.356	.6492132	-1.349726	0.4857376
Loans increase income (reference: disagree)							
Undecided	1.298869	0.764991	1.7	0.09 [c]	3.665151	-0.200486	2.798225
I agree	-0.004768	0.449681	-0.01	0.992	.9952434	-0.8861255	0.8765897
Continue production in the future (reference: disagree)							
Undecided	-2.969472	1.456854	-2.04	0.042 [b]	.0513304	-5.824853	-0.1140903
I agree	-1.328541	0.737653	-1.8	0.072 [c]	.2648634	-2.774314	0.1172319
1.satisfied with the information needed for production.(reference: not satisfied))	-0.877794	0.401401	-2.19	0.029 [b]	.415699	-1.664526	-0.0910619
1.Satisfied with your income (reference: not satisfied)	--0.11117	0.432837	-0.26	0.797	.8947864	-0.9595154	0.7371748
Educational status	0.153727	0.186753	0.82	0.41	1.166172	-0.212302	0.5197552
Number of people in the household	-0.128733	0.161056	-0.8	0.424	.879209	-0.4443965	0.1869312

[a]P<.01; [b]P<.05; [c]P<.10; VIF: Variance Inflation Factor; OR: Odds Ratio

3.3. Marginal effects

The average marginal effects of the factors affecting the subsidized loan demands of producers engaged in agriculture and livestock are given in Table 6.

Table 6- Marginal effects estimates for factors affecting agricultural credit demand

Variables	*Marginal effects (%)*	*Standard Error*	*Z*	*P>Z*	*[95% Conf. Interval]*	
Age (referans:20-30 age group)						
31-45 age group	-63.1[b]	0.271	-2.33	0.020	-1.163643	-.099275
46-60 age group	-83.01[a]	0.308	-2.69	0.007	-1.43597	-.2256313
61 and above age group	-96.9	0.62.2	-1.56	0.120	-2.189348	.2517993
Work other than agricultural activity (reference: no)						
Yes	14.74	0.252	0.59	0.558	-.3461207	.6408651
Retired	-42.2	0.545	-0.77	0.439	-1.490862	.6473191
Production activity (reference: Herbal)						
Animal	-51.8[c]	0.128	-1.78	0.075	-1.087559	.051689
Mixed	-91.6[a]	0.142	-3.39	0.001	-1.445245	-.3864712
2. market connection (referans: evet)						
No	-10.4	0.231	-0.45	0.654	-.5564631	.3493587
2.Your state of health (reference: good)						
Bad	57.3[a]	0.221	2.59	0.010	.1390903	1.006372
2.Housing ownership status (reference: yes)						
No	69.7[a]	0.204	3.42	0.001	.2969891	1.095911
Difficult credit conditions (reference: disagree)						
Undecided	157.3[a]	0.313	5.02	0.000	.958175	2.187027
I agree	95.6[a]	0.252	3.79	0.000	.4620364	1.450034
Loans are advantageous (reference: disagree)						
Undecided	-15.3	0.513	-0.30	0.766	-1.160379	.853916
I agree	-23.1	0.204	-1.13	0.258	-.6315253	.1693095
2.Consumer credit ownership (reference: yes)						
No	46.6[c]	0.270	-1.73	0.085	-.9952609	.0634263
Annual income (reference: 0-50 thousand TL)						
51-100 thousand TL	6.62	0.273	0.24	0.809	-.4700685	.6024783
101-150 thousand TL	5.04	0.324	0.16	0.870	-.5854964	.68638
151-200 thousand TL	-10	0.389	-0.26	0.797	-.8634588	.6634304
201 thousand TL above	60.7	0.559	-1.08	0.278	-1.703751	.4901212
Distance to district center (reference: 0-20 km)						
21-30 km	42.3[b]	0.197	2.14	0.032	.0353201	.8099466
31 above km	-40.6	0.276	-1.47	0.142	-.9467555	.1355305
2. Mobile/Internet banking usage status (reference: yes)						
No	44.2[c]	0.233	1.90	0.058	-.0144303	.8991869
2.Credit card usage status (reference: yes)						
No	19.3	0.198	0.97	0.331	-.1959245	.5816758
The required collateral is affordable (reference: disagree)						
Undecided	122.5[a]	0.187	6.55	0.000	.8584678	1.591977
I agree	-21.9	0.243	-0.90	0.367	-.6966954	.2577277
Loans increase income (reference: disagree)						
Undecided	54.2[c]	0.294	1.84	0.066	-.0352973	1.119257
I agree	-2	0.214	-0.01	0.992	-.4222193	.4176751
Continue production in the future (reference: disagree)						
Undecided	-142.7[c]	0.799	-1.78	0.074	-2.995168	.1400782
I agree	-54.6[b]	0.266	-2.04	0.041	-1.068715	-.0224059
1.satisfied with the information needed for production.(reference: not satisfied))	-39.7[b]	0.177	-2.25	0.025	-.7438899	-.050727
1.Satisfied with your income (reference: not satisfied)	-5.2	0.202	-0.26	0.797	-.4477021	.3440087
Educational status	7.2	0.870	0.82	0.411	-.0990238	.2423418
Number of people in the household	-6	0.0751	-0.80	0.424	-.2072024	.0871861

[a]P<.01; [b]P<.05; [c]P<.10

According to marginal effects, producers in the age group of 31-45, 46-60 are 63.1% and 83.01% less likely not to use credit than producers in the age group of 20-30, respectively. Producers engaged in mixed production activities are 91.6% less likely not to use credit than producers engaged only in crop production activities.

Producers in poor health are 57.3% more likely not to use credit than producers in good health. Producers who do not have a house in the province or district are 69.7% more likely to not use a loan than producers who do have a house. Producers who agree that the conditions for using credit are difficult are 95.6% more likely not to use credit than those who disagree. Producers with a distance of 21-30 km from the district center of the production activity are 42.3% more likely not to use credit than producers with a distance of 0-20 km from the district center.

Those who are undecided about whether they agree or disagree with the statement "requested collaterals can be met" are 122.5% more likely not to use credit than those who disagree with this statement. Those who agree with the statement that I will continue production in the future are 54.5% less likely to not use credit than those who do not agree with this statement. Those who are satisfied with the level of knowledge required for production are 39.7% less likely not to use credit than those who are not satisfied with the level of knowledge.

When marginal effects are analyzed, no statistically significant relationship is found between the probability of using loans and employment status, having another job, having a market connection, whether the loans are advantageous or not, annual income, credit card ownership, level of satisfaction with income, education level and number of people in the household. There is a relationship between personal loan assets ($p=0.085$), mobile banking usage status ($p=0.058$), the idea that loans will increase income (undecided $p=0.066$) the probability of using credit at the $P<0.10$ significance level.

4. Discussion

Subsidized operating and investment loans have been allocated to the agriculture and livestock sector in Türkiye for many years. These loans apply different interest rates to different production areas. Some of them have zero interest and some of them have 25%, 50% or 75% interest discount. Producers who want to benefit from these loans must meet the general and special conditions specified in the communiqué issued for these loans and determining the technical principles. Producers who do not meet the conditions can access the capital they need at current interest rates without benefitting from the discounted interest rate.

The aim of this study is to determine the economic and socio-demographic factors that may affect the demand for subsidized agricultural loans in Türkiye, as well as the characteristics of the enterprises within the scope of Erzurum province. As a result of the analysis, it was found that the variables of age, production activity, health status, home ownership status, difficulty of loan conditions, distance, affordability of the required guarantees, the idea of continuing production in the future, and satisfaction with the level of knowledge required for production were statistically significant on loan demand. There is no statistically significant relationship between the likelihood of using loans and employment status, having a market connection, whether the loans are advantageous or not, annual income, credit card ownership, satisfaction level with the income obtained, education level and the number of people in the household.

According to the results of the analysis, producers at lower age levels are more likely not to use credit. Producers in the 46-60 age group are 83.01% less likely not to use credit than those in the 20-30 age group. Similar results were found in many studies in the literature (Katchova 2005; Umanath et al. 2018; Lazaro & Alexis 2021). This can be explained by the fact that producers at older age levels gain experience and have the necessary knowledge. It has been stated that there is a negative relationship between age and the probability of using credit (Hayran & Gül 2018; Gong & Elahi 2022). Lin et al. (2019) stated that age has an effect on credit constraint, and Hu et al. (2020) stated that it does not have an effect on credit constraint.

Producers whose field of production activity is mixed production (plant and animal) are 91.6% less likely not to use credit. Producers in poor health are 57.3% more likely not to use credit than producers in good health. Producers who own their own houses are more likely to use credit. Producers without a house are 69.7% more likely not to use credit than those with a house. The fact that the collateral required by credit providers can be covered by the houses in question may explain why home ownership may increase the probability of loan utilization. In the literature, it is stated that producers' asset levels have a positive effect on access to credit (Ullah et al. 2020; Akdemir et al. 2021; Manogna & Mishra 2022).

Producers who do not agree that the conditions for using credit are difficult are more likely to use credit. Producers who agree that the conditions for using credit are difficult are 95.6% more likely to not use credit than those who disagree with the statement that the conditions are difficult. As the distance of the production activity location to the district center where the loan application can be made increases, the possibility of using a loan decreases. Producers whose distance to the district center is 21-30 km are 42.3% more likely to not use credit than producers whose distance is 0-20 km. Lazaro & Alexis (2021) stated in their study that distance has an impact on loan demand.

Those who are undecided about whether they agree with the statement that the required collateral is affordable are 122.5% more likely to not use a loan than those who do not agree with this statement. There are studies in the literature stating that the desired guarantees have an impact on the use or restriction of credit (Lazaro & Alexis 2021; Kuhn & Bobojonov 2021; Hu et al. (2020); Dang et al. (2019); Behera & Behera (2022). Those who agree with the statement "I will continue production in the future" are 54.5% less likely to use credit than those who disagree with this statement. Those who are satisfied with the level of knowledge are 39.7% less likely to not use credit than those who are not satisfied. There are similar studies stating that awareness of loans has an impact on loan demand (Lazaro & Alexis (2021); Behera & Behera (2022)).

Healthy producers are likely to be in business and use loans for agricultural needs. Additionally, financing institutions tend to give loans to healthy, young and middle-aged producers. This may explain why healthy individuals are more likely to use credit.

Many of the producers who do not use credit think that the conditions are difficult and avoid applying for credit, although they do not have much information about credit products and the credit granting process. Producers who want to continue their production activities in the future are more likely to use loans. Frequent fluctuations in production costs and sales prices of products do not satisfy manufacturers. For this reason, ensuring stability in production costs and sales prices is seen as a confidence-increasing factor in the sector. Producers who have or may experience problems in terms of collateral cannot access these loans or are one step behind when it comes to loan applications. Policy makers, taking into account intelligence inquiries to producers experiencing collateral problems, and providing collateral support to business owners will increase the demand for these loans and the amount of loans used.

The research may be biased as it is the data obtained through survey questions directed to the producers. The questions for determining the loan request are multiple choice and open-ended questions are not included. This may prevent manufacturers from giving an explanatory answer to their thoughts.

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