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Article

Factors that influence bank loans for agriculture in Romania

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Abstract: Agriculture is a determining factor regarding the development of the Romanian economy, noting its importance for population consumption and as a supplier of raw materials for the relaunch of other industries. Agricultural financing consists of credits granted to natural or legal persons for developing agricultural activities, expanding agricultural holdings, and commercializing agricultural production. The objective of this research is the statistical analysis of the determining factors in granting loans to Romanian farms. The study is based on the content analysis of the accounting reports of the 45 Romanian farms included in the research sample, based on which the profile of the farmer from the selected counties (Alba, Cluj, Mures, Sibiu, Dambovita and Prahova) is outlined. The obtained results highlight the fact that factors such as the requested amount (SUSO) are directly influenced by the worked area (TELU), by the turnover (CIAF), R = 0.6228, but also by the total value of the assets (TOTAL) R = 0.454. At the opposite pole, there is a weak correlation between SUSO and current liquidity (LICU), R = 0.2754, and the value of recorded expenses (CHEL), R = 0.3102. Implementing a credit policy that facilitates access to financing sources would support farms in modernization and development, increasing their competitiveness and general viability.

Keywords: agricultural credits; agriculture; bank credits; econometric analysis; Romania

1. Introduction

The agricultural sector was the key to economic development in Romania, especially before 1989, when it was the primary source of livelihood for almost 60% of Romanians. Even though agriculture experienced a period of recession at the national level, with Romania's accession to the EU, the agricultural sector experienced a revitalization, mainly due to the grants received, and thus continued to play an essential role in the country's economy because of the contribution its gross domestic product (GDP) accounted for 4.46% in 2022 (The Global Economy, 2022). At the level of Romania, there are favorable conditions for developing agriculture due to the available lands, the climatic conditions, and the labor force employed in this sector (Burja and Burja, 2016). Therefore, agriculture is essential for ensuring sustainability and transitioning to a green economy (Aceleanu, 2016). Romania has an agricultural area of 13.5 million ha in 2022 (European Commission, 2023a) and number one in the number of farms active in 2020 (Eurostat Statistic Explained,

2023). The arable lands are estimated at 38%, the pastures occupy 27%, forest 8% and haymaking are 4% of the land (Ramazanova et al., 2022). A significant number of these active farms, respectively 91.8% or 3.1 million, were less than 5 ha. Agricultural loans play an essential role for them, as small farmers can access affordable loans, improve their productivity, increase their food security, and expand their incomes. Furthermore, bank loans or obtaining non-reimbursable European funds can ensure the financing of the agricultural activity (Sîrbulescu et al., 2015). Feher et al. (2022) find that an increase in the performance of agriculture in Romania can be achieved by effectively restructuring agricultural production and increasing community assistance for Romanian farmers to become competitive in the foreign market.

Romania, as an EU member state, benefits through the European Agricultural Guarantee Fund in the period 2014–2020 from non-reimbursable external funds amounting to 4,098,000 EUR, allocations distributed according to the size of the farm, the agricultural area, but also other characteristics specific to the type of agricultural production (Vasile et al., 2015). Agricultural financing will bring important benefits through optimal production factors, increased agricultural areas, agricultural technologization, and improved production. However, it will also lead to a rise of producers' incomes and the country's GDP (Akdemir et al., 2021). The research conducted by Peng et al. (2021) shows that bank loans to farmers and rural enterprises have a substantial constructive effect on agricultural productivity growth and regional and national economic growth. Agricultural loans also play an essential role in streamlining and improving farmers' productivity, especially in developing countries, by providing the resources needed to supply farms, purchase agricultural land, modern equipment, or technology (Bahşi and Çetin, 2020). In addition, smallholder farming is crucial for food protection and poverty (Simumba et al., 2017).

Osabohien et al. (2020) suggest that farms that have benefited from agricultural loans have three times higher yields than farms that have not benefited from such facilities, as they are forced to take measures such as reducing consumption and retailing assets, which can lead to long-term to increase the level of poverty. However, access to credit by small farmers remains a challenge, especially in developing countries, where farmers own small, fragmented and subsistence farms (Bogan et al., 2015). In recent studies, factors affecting credit access have been the subject of extensive debate that credit applicants obtain loans only when they are eligible, following the requirements set by lending institutions (Kabayiza et al., 2021). Shah et al. (2008) observed that in the case of households with more adults, the tendency to access and grant agricultural loans increases because banking institutions have greater confidence in loan repayment. Khanal and Omobitan (2020) find that in the case of small farms, the involvement of a family member (spouse) in working outside the farm decreases by 40% the probability of not granting a bank loan because the income generated from the activity in off-farm can improve the probability of repaying the loan and minimize the possibility of using contracted financial resources for purposes other than agriculture. Akhtar et al. (2019) find that the farmer's experience, the size of the farm, the evolution of prices for agricultural products are significant factors for contracting a farming credit and better

management of credit risks. At the same time, belonging to farming organizations and the education of the chief farmer are variables that positively influence the participation of farmers in credit programs (Asante-Addo et al., 2017). Also, socio-economic factors such as age, household size, and income directly correlate with granting agricultural loans (Nguyen and Le, 2015). On the other hand, negative and statistically significant links were highlighted in terms of the unemployment rate, inflation rate and gross domestic product growth rate and the emergence of non-performing loans (Muhović et al., 2019). Weather-related agricultural risks and limited access to credit are severe barriers to agricultural productivity and growth in developing countries (Shee et al., 2019).

In this context, the research aims to analyze the determining factors in granting loans to farmers from the sample of the 45 Romanian farms. The research is based on a macro-economic analysis at a national level through theoretical documentation of existing research in the field but also on national statistical data, but also a regional analysis based on the content analysis of reports and accounting documents for farms in the selected sample from 45 farms in six counties (Alba, Cluj, Mures, Sibiu, Dambovita and Prahova) in Romania. The data source is the accounting documents of the farms that benefited from credits for the development of agriculture in Romania. The six counties forming the statistical sample ensure appropriate representativeness regarding the type of activity and organization. The innovative character of the present research is represented by the use of different statistical and dynamic techniques, ranging from the least-squares method to correlations and regression models.

2. Agricultural loans—A literature review

Increasingly difficult access to bank lending services is a limitation in the development of agriculture (FAO, 2002). Financial institutions that can provide credit to farmers are increasingly reluctant because they consider the agricultural sector extremely risky, agrarian production depending on external factors such as weather conditions and fluctuating prices of products obtained. All these aspects make it difficult to grant loans to farmers. To facilitate investment in agriculture and ease financial constraints, governments have made several efforts, including creating financial institutions for agriculture, giving direct subsidies, and guaranteeing loans up to a certain level (OECD, 2013). Du et al. (2019) showed that the limits imposed on accessing loans influence agricultural land abandonment. Agricultural credit plays a vital role in land use and agricultural production, the authors suggest an improvement in rural financial markets by improving farmers' incomes. Agricultural loans are long-term investment loans for the purchase of agricultural machinery, the construction or adaptation of facilities for agricultural production and the creation of the infrastructure necessary for the farm holding, the establishment or expansion of livestock farms, etc. (Shee et al., 2019). At the same time, formal agricultural credit allows farmers to procure and apply improved equipment, contributing to the technological modernization of farms and the efficient management of activities specific to agricultural holdings (Moahid et al., 2021). Széles et al. (2014) consider that an increase in the number of farming loans granted, accompanied by a declining

interest rate, can increase the financial resources of farmers needed for investments in agricultural enterprises. Agricultural credit is a vital policy in improving farm performance, as farms face financial constraints in their work (Wirakusuma and Irham, 2021).

Shkodra and Shkodra (2018) observed that small farms have lower access to bank loans and accept higher interest rates than medium and large farms, which have the self-financing capacity and can make their investments for modernization and mechanization of agricultural holdings. In their research, Seven and Tumen (2020) present evidence of international studies that support the positive relationship between agricultural credit and agricultural productivity and demonstrate using a combination of panel data that agricultural credit operates primarily on the agricultural component of GDP in developing countries and on agricultural labor productivity in developed countries. Agricultural loans have a statistically significant positive effect on beneficiaries' farm incomes, food security and women's empowerment (Sagbo and Kusunose, 2021). Sakhno et al. (2019) agree with increasing the volume of external financing and achieving a close relationship between the parameters: Loan-investment-increase in production and sales to form a functional environment, considering the possibilities of optimizing financial costs. Also, Sabasi et al. (2021) examine the association between approach to credit and agricultural efficiency in the US and the link with the residual profitability of resources. The results showed that increased access to credit is really linked with improved agricultural production and remaining productivity of assets. The research conducted by Regmi and Featherstone (2022) examines whether the risk of disappointment and the performance of agricultural banks are affected by banking consolidations, so by the two-way fixed regression models are calculated correlation indices between the impact of competition on the stability and financial performance of banks in US banks. Therefore, Petrea et al. (2020) recommend complementarity between the two sources of funding (agricultural support programs and agricultural loans) to achieve a better economic performance of the agricultural sector. Fatch et al. (2021) support agricultural diversity by improving the system of policies and practices. The research conducted by Ullah et al. (2020) indicates that farmers who own large farms, earn high farm incomes, have good access to information, training and have significant assets have easier access to credit. It also concludes that there is a need to adapt bank lending policies to farmers' different socio-economic and agricultural characteristics. Ameh and Lee (2022) found that annual farm income and interest rate positively impact loan access, while education, farming experience, farm size, off-farm income, and farm income significantly move loan use. Kadanalı and Kaya (2020) argued that one of the principal instruments in agricultural financing is agricultural lending. Through the causal relationships demonstrated by the Granger test, the authors showed that agricultural loans affect the value of agricultural production positively by increasing the value of the agricultural output. At the same time, Manoharan and Varkey (2021) note that doubling agricultural credit policy positively impacts agricultural productivity. Kučera et al. (2021) determine the absorption capacity of loans in the agricultural sector based on the difference in values of the Economic Value-Added Entity and EVA Equity and find that the financial leverage has a positive effect on the farming sector.

Kaya and Kadanalı (2022) find a positive effect of agricultural credit on agricultural production and suggest that bank lending policies can contribute to increasing the financial inclusion of farmers by increasing the provision of loans at lower interest rates. At the same time, Li et al. (2022) analyzed the relationship between agricultural insurance, agricultural loans, and the agricultural industry. They considered that strengthening the relationship between banking instruments and agriculture can contribute to the stimulation and development of agriculture in conjunction with efforts to educate and popularize these among farmers. In addition to bank loans, Noor et al. (2023) suggest that agricultural policy and the availability of government loans can encourage farmers to identify methods and techniques for increasing crop yields. On the other hand, the authors Mohsin et al. (2022) recommend that the relevant authorities encourage the development of new FinTech business models to stimulate banks and other financial institutions to increase the proportion of loans related to agriculture. Wahab et al. (2023) analyze agricultural credit in connection with agricultural productivity and climate change that significantly influence agricultural productivity and the ability of farmers to pay loan installments and suggest that collaboration between governments and banks is needed to develop agricultural and credit policies in conjunction with investment in farmer education consistent with climate change adaptation strategies. Simultaneously, Xu et al. (2023) state that critical factors, namely government policy encouragement, preferential support for agricultural loans, participation of specialized agricultural organizations, estimated income, and farmers' awareness of environmental protection, can contribute to the development and promotion of sustainable agriculture. Kumar et al. (2012) argue that small farmers become inefficient with insufficient production funds, reinforcing the direct relationship between credit and agricultural production (Du et al., 2019). The results of the study by Ankrah Twumasi et al. (2022) showed that the design of policies to promote and generate off-farm employment opportunities for rural households by government and decision-makers is essential because off-farm income could reduce some household expenses for which agricultural credit could be used if there was no offer. Employment on the farm. Understanding the sources of agricultural production credit is critical for regulators and policymakers concerned with the stability of financial institutions, agricultural production, and farmer welfare (Brewer et al., 2022). It was established that the expansion of the use of the loan contract in agriculture is a necessary lever for increasing the efficiency of production, the formation and constant restoration of a competitive technological base in modern conditions, and the further development of the entire agro-industrial complex (Artemenko et al., 2022). The major obstacles for agricultural producers can be found in capital constraints caused by limited access to credit that prevent investment in production and the implementation of modern technologies (Popović et al., 2018). In the context of ecological and sustainable development, farmers' demand for operational loans is increasing (Xia et al., 2022). To effectively promote the development of durable agriculture, inhibiting farmers' credit constraints is a necessary methodological measure. The emergence of agricultural supply chain financing has eased farmers' credit constraints while achieving commercial and long-term agricultural development (Gouri and Mahajan, 2017). Stakeholders in

agriculture, especially farmers, seek to maximize their private interests. Thus, economic tools are needed to inform how to allocate limited resources while avoiding risks optimally (Ombati Mogaka et al., 2022). Several studies have focused on the factors influencing the optimal financing and pricing decisions at the agricultural enterprise level (Tang et al., 2022). Recent articles have focused on land financing policies, which have been increasingly recognized as the most critical measures to address credit constraints in many developed and developing countries (Ma et al., 2015; Khanal and Omobitan, 2020). Jordan et al. (2021) argued that to face the challenges in the agricultural sector, collective-constructive action policies must be adopted to improve agriculture's effects on the environment and increase technological innovation. The standard agricultural policy (European Commission, 2023a) was adopted at the EU level, supporting a fairer, more ecological, and result-oriented agriculture (European Council, 2023). The Common Agriculture Policy (CAP) also supports the achievement of the objectives of sustainable development following the European Green Pact and ensures the future of the development of agriculture and forestry (European Commission, 2023b). In accordance with this policy, the strategic plan was adopted at the level of Romania, which provides a value of 14.9 million EUR in order to improve the means of subsistence of farmers and ensure financial support for innovative investments at the level of farms and production units (Euractiv, 2022).

The purpose of banking institutions that provide financing for economic and agricultural activities in rural areas is to promote development. However, there are considerable differences between Romania's areas in terms of granting bank loans. Analyzing the portfolio of agricultural loans offered by the leading banking institutions in Romania, the central agricultural loans systematized in **Figure 1** were found and the main requirements, guarantees and repayment period were identified, respectively: i) The loan for the purchase of agricultural land is granted for the acquisition of a new agricultural land or the extension of an existing land, for a maximum period of 180 months, granting up to 85% of the investment value and requesting the guarantee of existing agricultural land or purchased from credits; ii) Credit for the establishment and maintenance of agricultural crops helps to finance the costs of setting up or maintaining agricultural crops for the entire agricultural year, being granted for a period between 12–24 months and is guaranteed by the obtained agricultural crop, machinery, land or buildings owned; iii) The credit for working capital in agriculture finances the expenses for the maintenance and establishment, harvesting and insurance of agricultural crops carried out in own regime or by third parties, the expenses with the suppliers of electricity, water, irrigation and with the salary fund, is granted on a period of maximum 18 months, with the possibility of renewal, the minimum amount requested can be 7000 EUR, and the farmer must present a mix of guarantees that include land, real estate and/or guarantee funds, equipment, machinery, movable mortgage on current accounts, guarantee personal guarantee, in accordance with banking regulations; iv) The loan for the purchase of agricultural inputs is granted only to farmers with at least 2 years of experience and who have a farm of at least 50 hectares, for short-term financing of the acquisition of inputs (seeds, fertilizers, pesticides, diesel, etc.) necessary for establishment or maintenance agricultural crops. The guarantees requested in the

case of this type of loan consist of: Surety contracts signed with shareholders/administrators and the movable mortgage on the bank accounts opened by the client at the bank where the loan is requested; v) The loan for irrigation finances up to 5,000,000 lei (approximately 1,000,000 EUR) for any expense necessary to build an irrigation system for a maximum period of 12 years and depending on the amount requested the bank guarantees requested may be irrigation equipment, agricultural land, crops; v) The loan for storage spaces contributes to the construction/extension of horizontal (halls) and vertical (silos) storage facilities, respectively for weighing, handling, air circulation equipment, etc., necessary for the storage space for a period of 5–10 years , the required guarantees consist of the built warehouse, the arable land, other real estates; vi) The loan for agricultural equipment finances the amount needed to purchase new or used equipment and machinery, can be granted for a period of 5–7 years, and the central guarantees required are either the equipment purchased by the farmer, the stock of equipment from the dealer, or other available assets that can be capitalized; vii) The loan for farmers affected by drought grants up to 1000 lei/ha (approximately 200 EUR) calamity for payment of suppliers of inputs and services, cost of rent, costs for taxes and duties, the necessary guarantees being agricultural land, farm, machinery, other real estates, grain stock.

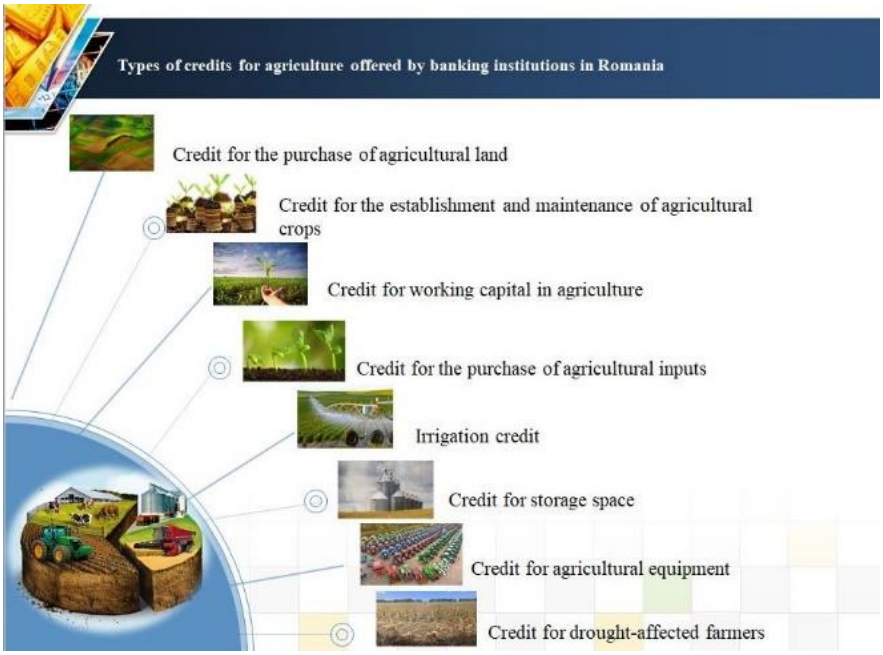

Figure 1. Types of agricultural loans offered by banking institutions in Romania.

As we can observe in **Figure 1**, Romanian banks finance investments in agricultural infrastructure-land, warehouses, machines, and equipment, but also irrigation infrastructure, both to obtain economic benefits, but also to support social objectives, such as creating new jobs in the agricultural sector and improving the quality of life in the communities concerned. However, the primary limits of agricultural financing lie in random production, uncertain profitability due to climatic factors, farmers' experience, cultivated land, and, last but not least, high costs that can lead to a lack of profitability on farms. Romanian agriculture, both during the pre-accession period (2000–2006) and after the accession to the EU in

2007, was characterized by the possibility of development based on investments financed from European sources. Thus, agricultural organizations had the opportunity to promote investment projects that could be financed from Special Accession Programme for Agriculture and Rural Development (SAPARD) funds (for the pre-accession period) or funds of the PNDR—National Program for Rural Development (PNDR for the post-accession period). Under these conditions, Ministry of Agriculture and Rural Development (MADR) intends to continue to use the resources that have returned from the financial instruments implemented up to this date for the continuation and, as the case may be, the expansion of the national schemes through which financing is granted both to farmers, including young farmers, and enterprises in the food industry sector (MADR, 2023). In Romania, agriculture from the middle of the 20th century is characterized by a meager yield due to an extensive technological system associated with drought, affecting more than 2/3 of the arable land. Under these conditions, the state's land policy aimed to expand the arable surface to 10 million hectares and improve technology. In this sense, a priority role was played by land rehabilitation works, primarily through irrigation, which would be imposed on 5.5 thousand ha about 55% of arable land (Lup et al., 2016).

3. Methodology

For efficient and intelligible statistical data processing, the variables used, and their significance are presented in **Table 1**. The econometric analysis includes regression models and testing the statistical and economic importance of the impact of independent variables on the requested credit. Graphical and econometric analysis of statistical data used STATA statistical processor (STATA Release 15.1).

Table 1. Statistical variables and their description.

Variable	Description
FO	Organization form
SUSO	Solicited sum
TELU	Total land worked ha (arable or pasture)
CIAF	Turnover
LICU	Current liquidity
CHEL	Expenses
TOTA	Total assets
AI	Authorized individuals
LLC	Limited liability companies
IC	Investments

Bank loans represent a large part of the forms of financing in agriculture. In order to determine the influencing factors, farmers from the Alba, Cluj, Mures, Sibiu, Dambovita and Prahova regions were involved. All farmers were included in the initial analysis, after which we eliminated those who did not access this type of loan, respectively those who did not have the necessary data available. The choice of

variables was relegalized according to the availability of data and according to their influence on bank loans.

To carry out the research, it is significant to analyze the structure of the sample concerning some significant variables in terms of the profile of the Romanian farmer. The first variable with which we highlight the sample structure is the form of organization (FO). The sample consists of approximately 58% Authorized Individuals (AI), 27% Limited Liability Companies (LLC), 13% Individual Enterprises (IE) and 2% Family Enterprises (FE). LLCs and AIs are the most common forms of organization in the sample. The sample structure concerning the type of agricultural activity shows that 53% of the farms in the sample are mainly engaged in animal husbandry, 16% in cereals and livestock, 16% in cereals only, and 15% in beekeeping, vegetable growing, floriculture, fruit growing, etc. In addition, 85% of farms have a good and excellent history of their relationship with financial institutions. The sample is divided as follows: 69% of agricultural holdings of maximum 50 ha, 20% between 50 and 100 ha, and 11% are farms larger than 100 ha. As can be seen in terms of agricultural area, most of the farmers included in the study are part of the small farmers' category; however, through loans from banking institutions, they have been able to improve their activity due to the use of modern technologies, thus contributing to increased yields economic and profitability.

Having established the statistical sample and the profile of the Romanian farmer, the research continues through the econometric analysis of the leading indicators that impact the value of agricultural credit that banking institutions should consider when studying the documentation on lending.

4. Results

This section analyses the impact of some critical factors on the amount requested by the farmer, which should be taken into account by financial institutions when studying the documentation regarding the granting of loans. In this sense, the following economic indicators were selected: amount requested, land worked, turnover, current liquidity, expenses, total assets.

4.1. The land worked (TELU)

The impact of the land worked area on the requested credit is summarized in **Figure A1** (Appendix A) and **Tables 2–4**. The correlation matrix between the two variables (SUSO and TELU) indicates a correlation of 0.5932, meaning the statistical link is highly intense and deserves to be analyzed. Furthermore, **Figure A1** suggests a direct linear statistical association between the two variables, which means that an increase in the area worked entails increasing the required amount.

According to **Table 2**, we analyze the impact of the worked surface on the requested amount for the whole sample. The econometric model is linear, as seen in **Figure A1**. Therefore, the regression coefficient of the variable TELU is equal to approximately 476. This means that at an increase of one hectare of the worked area, the requested amount increases on average by 476 lei (96.20 EUR), generating a significant economic impact. The independent variable TELU is statistically significant because the statistic $F = 18.45$ and the p-value is 0.000. At the same time,

the variation of the requested amount is explained in a proportion of 35.19% by the variation of the worked surface. This indicates that there are other factors influencing the variation in the amount requested. The impact of the worked surface is statistically significant because the *p*-value corresponding to this variable is 0.000. The confidence interval for the independent variable is 252–699.

Table 2. Linear regression between SUSO and TELU for the entire sample.

SUSO	Coefficients	err. st.	*t*	*P* > |*t*|	conf. int.
TELU	476	110.8	4.30	0.000	252–699
cons	29,437	5852	5.03	0.000	17,627–41,248

* Observations number = 44; F (1.42) = 18.45; Root MSE = 25,148; Prob > *F* = 0.0001; *R*-squared = 0.3519.

Table 3 analyses the restricted econometric model for the form of organization LLC. It is essential to point out that, in this case, the average increase of the requested amount is 655 lei (132.37 EUR) for an increase of one hectare of the worked area.

Table 3. Linear regression between SUSO and TELU for FO = LLC.

SUSO	Coefficients	err. st.	*t*	*P* > |*t*|	conf. int.
TELU	655	130.8	5.01	0.001	364–947
cons	27,871	11,179	2.49	0.032	2961–52,781

* Observations number = 12; F (1.10) = 25.13; Root MSE = 21,339; Prob > *F* = 0.0005; *R*-squared = 0.5950.

Table 4. Linear regression between SUSO and TELU for FO = AI.

SUSO	Coefficients	err. st.	*t*	*P* > |*t*|	conf. int.
TELU	540	93.3	5.79	0.000	347–733
cons	22,799	3560	6.4	0.000	15,434–30,164

* Observations number = 25; F (1.23) = 33.56; Root MSE = 15,287; Prob > *F* = 0.0000; *R*-squared = 0.6163.

A similar study was conducted for the form of AI organization. The econometric model is statistically and economically valid. This means that at an increase of one hectare of the worked area, the requested amount increases on average by 540 lei (109.13 EUR), a significant value from an economic point of view. The requested amount increases on average by 115 lei (23.24 EUR) more in LLCs than AIs. Therefore, LLCs are more credible in their relationship with lending institutions.

4.2. The turnover (CIAF)

The correlation matrix between the two variables (SUSO and CIAF) indicates a correlation of 0.6228, one of the largest.

According to **Figure A2**, we can state that the red line suggests a linear and direct link between the amount requested by farmers and turnover. This implies that an increase in turnover results in an increase in the amount requested. The econometric model between the two variables is a linear one and is presented in

Table 4. In **Table 5**, the impact of the turnover on the requested amount is quantified numerically in the whole sample. The regression coefficient of the CIAF variable is equal to approximately 0.168. Thus, at an increase of 100 lei (20.21 EUR) in the turnover, the requested amount increases on average by around 17 lei (3.44 EUR), significant also from an economic point of view. The CIAF independent variable is statistically significant because the statistic F = 19.25 and the p-value is 0.000. The variation of the requested amount is explained in a proportion of approximately 39% by the turnover variation. The impact of turnover is statistically significant because the p-value corresponding to this variable is 0.000. The confidence interval for the independent variable is between 0.09 and 0.24. As a result, we guarantee a probability of 0.95, the membership of the regression coefficient of the independent variable CIAF at this interval.

Table 5. Linear regression between SUSO and CIAF for the entire sample.

SUSO	Coefficients	err. st.	*t*	*P* > |*t*|	conf. int.
CIAF	0.168	0.038	4.39	0.000	0.09–0.24
cons	26,592	5520	4.82	0.000	15,460–37,725

* Observations number = 45; F (1.42) = 19.25; Root MSE = 27,514; Prob > F = 0.0001; R-squared = 0.3879.

Table 6 shows a restricted form of the econometric model only for the AI form of organization. And in this case, the impact of the CIAF variable is statistically significant, and from the economic point of view, we can say that SUSO increases at an increase of 100 lei (20.21 EUR) of the CIAF variable on average by approximately 30 lei (6.06 EUR). Next, we will estimate the simultaneous impact of two determining factors on the requested credit. In this sense, an econometric model with two independent variables will be introduced.

Table 6. Linear regression between SUSO and CIAF for FO = AI.

SUSO	Coefficients	err. st.	T	*P* > |*t*|	conf. int.
CIAF	0.298	0.082	3.65	0.001	0.13–0.47
cons	11,272	6502	1.73	0.096	−2148–24,693

Table 7 shows the correlation matrix between three variables: SUSO, TELU and CIAF. SUSO is the dependent variable, and TELU and CIAF are independent variables. There is a sufficiently high correlation between the dependent and independent variables to quantify the impact numerically. In parentheses is specified the level of significance for each correlation coefficient. It is less than 5%.

Table 7. Correlation matrix.

Variable	SUSO	TELU	CIAF
SUSO	1.0000	-	-
ELU	0.4885 (0.0007)	1.0000	-
CIAF	0.6228 (0.0000)	0.3318 (0.0260)	1.0000

The econometric model with two independent variables is presented in **Table 8**. The impact of the TELU variable on the SUSO variable is statistically significant (*p*-value = 0.015 < 0.05). We find the same in the case of the CIAF variable (*p*-value = 0.000 < 0.05). The regression coefficients of the two variables are positive, which means that an increase in the independent variables shows an increase in the dependent variable. We note that these two factors explain 48% of the variation of the requested loan. The introduction of turnover in the model has increased this proportion from 39% to 48%. The difference up to 100% is caused by other impact factors on the requested credit. Since Prob > F = 0.0000, the impact of the two variables is statistically significant. The impact is significant economically because, at an increase of one ha of the cultivated area, the credit increases on average by 289 lei (58.41 EUR), and, at an increase by 100 (20.21 EUR) of the turnovers, the credit increases on average by 14 lei (2.83 EUR).

Table 8. Linear regression between SUSO, TELU and CIAF for the entire sample.

SUSO	Coefficients	err. st.	*t*	*P* > |*t*|	conf. int.
TELU	289.033	113.642	2.54	0.015	59–518
CIAF	0.140	0.040	3.49	0.001	0.059–0.220
Cons	19,340.440	3840.293	5.04	0.000	11,590–27,090

* Observations number = 45; F (2.42) = 43.56; Root MSE = 25,729; Prob > *F* = 0.0000; *R*-squared = 0.4772.

4.3. Current liquidity (LICU)

The correlation matrix between SUSO and LICU indicates a correlation coefficient of 0.2754 (approximately 28%). The positive sign shows us a positive correlation, meaning they evolve in the same direction. The statistical cloud, presented in **Figure A3**, confirms the above. The red line suggests a linear connection. **Table 9** shows that the amount granted to the farmer varies between 10,000 lei and 160,000 lei (2020.98–32,335.64 EUR). On average, a farmer asks for 50,760 lei (10,258.48 EUR). There is a large standard deviation (34,767), which means a considerable inhomogeneity in loan applications. The variation interval of the current liquidity is large (0.1–32.89). In the sample, we have farms with a high degree of risk, and which still obtain loans.

Table 9. Summary statistics.

Variable	Obs.	Media	St. Dev.	Min	Max
SUSO	45	50,760	34,767	10,000	160,000
LICU	32	4.5	8.02	0.1	32.89

The econometric model between the two variables is summarized in **Table 10**. The link expressed by the model is statistically significant because the *p*-value for the LICU variable is below the chosen significance level (5%). This records a substantial impact of current liquidity on the requested credit. To increase one unit of current liquidity, the requested loan increases on average by 1,276 lei (257.88 EUR). We guarantee a probability of 0.95 belonging of this value to the confidence interval

456–2087. The impact of the current liquidity variation on the requested credit variation is explained in a proportion of 8%. From an economic point of view, the significance of the LICU variable on the SUSO variable is less relevant.

Table 10. Linear regression between SUSO and LICU for the entire sample.

SUSO	Coefficients	err. st.	*t*	*P* > |*t*|	conf. int.
LICU	1271.6	399.3	3.18	0.003	456–2087
Cons	54,149.6	7378.76	7.34	0.000	39,080–69,219

* Observations number = 32; F (1.30) = 10.14; Root MSE = 36,206; Prob > F = 0.0034; R-squared = 0.0759.

Table 11 presents the econometric model between the variables SUSO and LICU only for the case where IC = investments. The relevant elements do not change significantly. However, there is an increase in the percentage (to 11%) of explaining the variation of the requested credit in relation to the variation of the current liquidity.

Table 11. Linear regression between SUSO and LICU for IC.

SUSO	Coefficients	err. st.	*t*	*P* > |*t*|	conf. int.
LICU	1495.3	419.2	3.57	0.002	623–2367
cons	46,746.6	9364.03	4.99	0.000	27,273–66,220

*Observations number = 23; F (1.21) = 12.72; Root MSE = 38,078; Prob > *F* = 0.0018; *R*-squared = 0.1185.

4.4. Expenses (CHEL)

The correlation matrix between the variables amount requested and expenses indicates a correlation coefficient of 0.3102, guaranteed with a probability of over 95%. Some significant statistics on the behavior of the CHEL variable are presented in **Table 12**. On average, a farmer has 129,936 lei (26,259.78 EUR) expenses per year, and the standard deviation is 195,512 lei (39,512.54 EUR). This shows that there is a considerable variation in spending from one farm to another. The expenses vary in various values, between 10,000 lei and 1,117,582 lei (2020.98–225,860.84 EUR).

Table 12. Summary statistics.

Variable	Obs.	Media	St. Dev.	Min	Max
SUSO	45	50,760	34,767	10,000	160,000
CHEL	44	129,936	195,512	10,800	1,117,582

The statistical cloud represented in **Figure A4** shows a weak link between the specified variables. The points of the cloud are not arranged according to the red line present in the graph. It is important to note that an increase in expenses entails an increase in the requested credit. It is expected that with the increase in costs, the farmer needs capital to support the business. Therefore, the arrangement of the statistical cloud around the trend is not relevant, which means that the model is less significant.

The significant elements of the econometric model with two variables for the whole sample are presented in **Table 13**. An increase of 100 lei (20.21 EUR) of the expenses determines an increase of the requested amount by 5 lei (1.01 EUR). Thus, the impact of expenditures on the requested credit is economically insignificant. Furthermore, the *p*-value for the CHEL variable is 15.1% (over 5%), which means that this influencing factor is statistically negligible.

Table 13. Linear regression between SUSO and CHEL for the entire sample.

SUSO	Coefficients	err. st.	*t*	*P* > |*t*|	conf. int.
CHEL	0.0553	0.037	1.46	0.151	0.02–0.13
cons	44,276.03	6030.2	7.34	0.000	32,106–56,445

*Observations number = 44; F (1.42) = 2.14; Root MSE = 33,521; Prob > F = 0.1513; R-squared = 0.0962.

Table 14 shows a restriction for the econometric model, respectively, the form of AI organization. For an increase of 100 lei (20.21 EUR) of the expenses, the requested credit will increase on average by 46 lei (9.30 EUR). It is economically significant to increase the credit in relation to the registered expenses. The impact of expenditures on the requested amount is statistically significant because the *p*-value of the CHEL variable is 0%, below the significance threshold of 5%.

Table 14. Linear regression between SUSO and CHEL for FO = AI.

SUSO	Coefficients	err. st.	*t*	*P* > |*t*|	conf. int.
CHEL	0.461	0.103	4.50	0.000	0.25–0.77
cons	17,290.88	4371.5	3.96	0.001	8247–26,334

*Observations number = 25; F (1.23) = 20.22; Root MSE = 26,388; Prob > F = 0.0002; R-squared = 0.4135.

Figure A5 reinforces the statements made to the linear econometric model between the variable SUSO and the variable CHEL. The trend marked by the red line is more relevant in relation to the arrangement of the statistical cloud. According to the obtained results, it seems that the AIs are more sensitive to the variation of the requested credit in relation to the variation of the expenses.

4.5. Total assets (TOTA)

The correlation coefficient between the variables SUSO and TOTA is high enough (0.454) to weld the statistical link between the two variables. Some summary statistics about the variables SUSO and TOTA are presented in **Table 15**. The average total assets, referring to the reference year, is 338,564 lei (68,423.03 EUR), and the variation range of this indicator is between 9606 and 1,373,313 lei (1941.35–277,543.50 EUR). The variation, quantified by the standard deviation equal to 291,328 lei (58,876.74 EUR), is considerable.

Table 15. Summary statistics.

Variable	Obs.	Media	St. Dev.	Min	Max
SUSO	45	50,760	34,767	10,000	160,000
TOTA	44	338,564	291,328	9606	1,373,313

Figure A6 shows the arrangement of the statistical cloud around the linear trend, marked with the red line, for the entire sample. We hypothesize that there is a linear econometric model between the two variables. The essential elements of the model are presented in **Table 16**. The impact of the TOTA variable on the SUSO variable is statistically significant. The *p*-value of this variable is 0.014, which means that it falls within the significance threshold of no more than 5%. From an economic point of view, we can say that when the total assets increase by 100 lei (20.21 EUR), the bank can grant an average of 4 lei (0.81 EUR). Less economically significant is this figure far too small. The variation in the requested amount is explained in a proportion of approximately 21% by the variation of the total assets.

Table 16. Linear regression between SUSO and TOTA for the entire sample.

SUSO	Coefficients	err. st.	*t*	*P* > |*t*|	conf. int.
TOTA	0.0481	0.018	2.56	0.014	0.01–0.08
Cons	31,988.54	6670.3	4.80	0.000	18,527–45,499

*Observations number = 44; F (1.42) = 6.58; Root MSE = 27,832; Prob > F = 0.0140; R-squared = 0.2061.

The narrow econometric model for AIs is much more significant. The variation of the requested amount is explained in a proportion of approximately 48% by the variation of the total assets. It is an essential factor regarding the significance of the impact on the dependent variable. The average increase of the requested amount by 8 lei (1.62 EUR) is double the average increase in the entire sample. The model is also statistically significant, according to the elements in **Table 17**. Therefore, we can say that the restricted econometric model for AIs is more relevant than the model for the whole sample.

Table 17. Linear regression between SUSO and TOTA for FO = AI.

SUSO	Coefficients	err. st.	*t*	*P* > |*t*|	conf. int.
TOTA	0.076	0.016	4.65	0.000	0.04–0.10
cons	19,591.03	4133.4	4.74	0.000	18,040–28,141

*Observations number = 25; F (1.23) = 21.58; Root MSE = 17,854; Prob > *F* = 0.0001; *R*-squared = 0.4766.

Tables 18 and **19** present an econometric model with two independent variables with simultaneous action on the dependent variable. We consider SUSO as a dependent variable and TOTA and LICU as independent variables. The correlation matrix in **Table 19** allows us to analyze this impact. There must be as little correlation as possible between the independent variables. The correlation coefficient between TOTA and LICU is 0.0375 guaranteed with a probability of 0.8411, which

ensures the relative independence of the two impact factors.

Table 18. Correlation matrix.

Variable	SUSO	TOTA	LICU
SUSO	1.0000	-	-
TOTA	0.4540 (0.002)	1.0000	-
LICU	0.2754 (0.127)	0.0375 (0.8411)	1.0000

The econometric model with two independent variables is presented in **Table 19**. It is observed that the impact of the two variables is approximately the same as in the case of simple econometric models, separately for each variable. This is an additional argument that the model with two independent variables is correctly specified. It is normal to assume that total assets are independent of current liquidity. The two variables explain in a proportion of 28% the variation of the requested amount. For an increase of 100 lei (20.21 EUR) of total assets, the amount requested increases on average by 4.2 lei (0.85 EUR), maintaining constant current liquidity at the average level. For a 1% increase in current liquidity, the amount requested increases on average by 1288 lei (260.30 EUR), keeping total assets at average.

Table 19. The linear regression between SUSO, TOTA and LICU for the entire sample.

SUSO	Coefficients	err. st.	*t*	*P* > |*t*|	conf. int.
TOTA	0.042	0.021	1.98	0.058	−0.001–0.085
LICU	1288.3	464.01	2.78	0.010	337.8–2238.8
cons	34,412.83	8572.18	4.01	0.000	16,853–51,972

*Observations number = 31; F (2.28) = 8.77; Root MSE = 28,871; Prob > F = 0.0011; R-squared = 0.2751.

Regarding the empirical analysis, the following essential aspects can be highlighted regarding the quantification of the impact of the determining factors on the dependent variable SUSO, respectively:

- The farmer's amount requested (SUSO) is directly influenced by the cultivated land area (TELU). This means that at an increase of one hectare of the worked area, the bank will increase on average the requested amount by 476 lei (96.20 EUR), which has a significant economic impact. The variation of the requested amount is explained in a proportion of 35.19% by the variation of the worked surface. Therefore, it is a relevant factor that the bank must consider in granting the requested loan.
- Another determining factor with a significant influence on the amount requested by farmers is the turnover (CIAF). The correlation between the two variables is high (0.6228). At an increase of 100 lei (EUR 20.21) in turnover, the amount requested increases on average by approximately 17 lei (EUR 3.44), which is economically significant. The variation in the requested amount is explained in a proportion of roughly 39% by the turnover variation. Therefore, it is the factor that has the most significant weight on the variation of the requested credit.
- Current liquidity (LICU) is one of the most important financial rates of a

company and measures its ability to pay debts. The econometric model shows a weak correlation between the two variables (0.2754). There is a considerable variation of this indicator in the analyzed sample, which raises a question mark on how to grant credit. To increase one unit of current liquidity, the requested loan increases on average by 1,276 lei (257.88 EUR). The impact of the current liquidity variation on the requested credit variation is explained in a proportion of 8%, a very small percentage in relation to the importance given to this indicator.

- The correlation coefficient between the requested amount and expenses (CHEL) is 0.3102. The level of farm spending should weigh on the bank's decision. An increase of 100 lei (20.21 EUR) of the farm's expenses determines an increase of the requested amount by 5 lei (1.01 EUR). The impact of expenditure on the requested credit is economically insignificant. The effect of the expense's variation on the requested credit variation is explained in a proportion of 10%. The increase in expenses causes the farmer to resort to loans, provided that he carefully manages the income and expenditure flow.
- The correlation coefficient between the variables SUSO and TOTA is high enough (0.454). The average of the total assets, referring to the reference year, is 338,564 lei, and the variation range of this indicator is between 9606 and 1,373,313 lei (1,941.35–277,543.50 EUR). The variation, quantified by the standard deviation equal to 291,328 lei (58,876.74 EUR), is substantial. From an economic point of view, we can say that when the total assets increase by 100 lei (20.21 EUR), the bank can grant an average of 4 lei (0.81 EUR). Less economically significant is this figure, far too small.
- The research results show that it is necessary to propose a model to reorient the accessibility of agricultural loans to rural areas. The model must follow the development, local and regional growth and be based on a series of variables that allow the capitalization of productive activities, taking advantage of the potential of each region—natural and human resources. From the empirical research conducted, among the variables considered key to the implementation of the model are turnover, total assets, human capital, and the characteristics of empowerment and innovation.

The results of this study are in complementarity with various scientific researches carried out at the international level, such as: Ameh and Andrew (2017) who analyzed the socio-economic factors affecting agricultural loans among small rice farmers and highlighted that age, household size, education, farm size, cooperative membership and annual income are significant factors influencing the probability of access to loans for farmers; Saqib et al. (2018) and Asogwa et al. (2014) identified monthly income, total land size, education and experience in agriculture as essential factors in access to agricultural loans; Ameh and Lee (2022) through a quantitative research among small farmers found that marital status, farm size and interest rate were all positive and significant influences on farmers' sources of credit; Bahşi and Çetin (2020) examined the relationship between the value of agricultural production and agricultural credits and identified a dependency relationship between agricultural credits and macroeconomic indicators. Also, Akhtar

et al. (2019) present a positive and significant relationship between farm income and farmers' access to agricultural loans. At the same time, the research carried out by Ullah et al. (2020) indicates a high positive association between the volume of assets owned by farmers and access to credit. Isitor et al. (2014) showed that the employed workforce, the source of credit, the size of previous loans, and the guarantees granted are significant and positive determinants that influenced farmers' obtaining of agricultural loans.

5. Conclusion

The lack of financial resources to carry out current agricultural activities and make investments forces farmers to resort to loans offered by specialized financial institutions. The farm structuring survey contributes to assessing the agricultural situation in the sample selection area to monitor trends and changes in the structure of agricultural holdings while shaping the impact of external events or proposals for new agrarian policies. This empirical study outlines the profile of the farmer in the selection area of the sample and some econometric models that include determining factors that influence the requested credit. Thus, as a percentage, 53% of the farms in the sample are mainly engaged in animal husbandry, 16% in cereal cultivation and animal husbandry and 16% only with cereal cultivation. The rest of the farms deal with beekeeping, vegetables, floriculture, fruit growing, etc. In recent years, the number of newly registered AIs has increased. It is the most agreed form of Romanian farmers. This form of organization represents 58% of the sample structure. AI has an inferior position in relation to financial, banking, and non-banking institutions. The AI is less transparent and implicitly less credible to creditors. The sample is fragmented in most agricultural holdings of no more than 50 ha (approximately 69%). Farms between 50 ha and at most 100 ha are in the proportion of 20%. About 11% are farms that work in an area of more than 100 ha. The area operated by a farm is a determining factor in granting a loan by the financial institution. The mainly hilly area in the sample selection area is a significant shortcoming in forming farms with large agricultural areas.

The worked area is one of the factors with a significant impact on the requested amount. The variation of the requested amount is explained in a proportion of approximately 35% by the variation of the worked surface. Therefore, it is a relevant factor that the bank must consider in granting the requested loan. Turnover is the factor with the most significant impact on the dependent variable. The variation of the requested amount is explained in a proportion of approximately 39% by the turnover variation. It is the factor that has the most significant weight on the variation of the requested credit. It is an expected result that explains the priority of high-income farmers in granting loans. Although current cash flow is one of the most important financial rates of a company, which measures the ability to pay debts, the impact of current liquidity variation on the requested credit variation is explained in a proportion of 8%, a very small percentage compared to the importance given to this indicator. Nevertheless, the high degree of variation of this indicator raises significant questions about the credit grant modality. The impact of expenses variation on the requested credit variation is explained in a relatively small

proportion (10%). The high costs cause the farmer to resort to loans, provided that he carefully manages the inflows and outflows from the farm. Therefore, the impact of this factor is economically insignificant.

A recommendation for improving the agricultural lending sector in Romania is to involve the state more closely by adopting laws and regulations to facilitate farmers' access to finance, granting guarantees and subsidies to novice farmers to improve the socio-economic status of small farmers. Improving access to financing sources would support farms in the modernization process and more intense market orientation, including participation in short supply chains, in the process of more competitive procurement of inputs, diversification of production, and improvement of operations and overall viability. Thus, there is a need for financial instruments that ensure adequate banking solutions at sustainable costs.

The limitations of the research are highlighted by the relatively small sample of farms analyzed. From future perspectives, the authors intend to extend the sample analyzed at a national level and perform a comparative analysis between Romania and Southeast European countries in terms of funding sources accessed by farmers for the development and mechanization of agricultural holdings and identifying the main factors determining access to agricultural credits at international level.

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Appendix

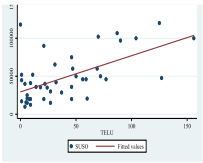

Figure A1. Statistic cloud between SUSO and TELU.

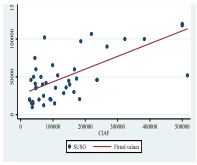

Figure A2. Statistic cloud between SUSO and CIAF.

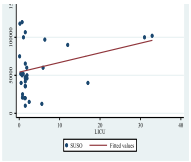

Figure A3. Statistic cloud between SUSO and LICU.

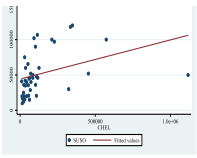

Figure A4. Statistic cloud between SUSO and CHEL.

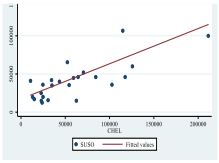

Figure A5. Statistic cloud between SUSO and CHEL for FO = AI.

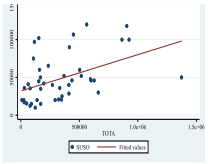

Figure A6. Statistic cloud between SUSO and TOTA.