

Critical Factors Influencing Credit Access among Smallholder Coffee Farmers: Evidence from Colombia

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ABSTRACT

Access to credit is an important factor that can contribute to development in rural areas. Despite the diversity of available offerings, the financing gap persists. Numerous studies have highlighted factors influencing farmers' access to credit. Given the relevance of the topic and the importance of coffee production in Colombia, this study aimed to identify factors influencing access of smallholder coffee producers to agricultural credit. For this purpose, a logistic regression was conducted. A total of 237 producers located in a highly recognized coffee-producing region in Colombia participated in the study. The findings indicate that marital status, farm size, productivity, perceived impact of financing on production, satisfaction with credit options, and participation in training programs are determinants of farmers' access to agricultural credit. These results can be used by policymakers and financial institutions to generate actions that allow greater credit access for small farmers.

Key words: Agricultural credit; Colombian coffee; smallholder coffee producers.

1 INTRODUCTION

In Colombia, the role of coffee agribusiness as the driving force for development is indisputable. As in other coffee-producing regions of the world, coffee farming may contribute to poverty reduction in rural areas (Rubio-Jovel et al., 2024). In addition, coffee farming supports ecosystem and biodiversity conservation and provides ecosystem services, including carbon sequestration, since most crops are grown under agroforestry systems (Rojas-Ospina, Zuñiga-Collazos, & Castillo-Palacio, 2024). Coffee production also promotes associative processes that, in turn, enhance social capital (Rojas-Ospina, Zuñiga-Collazos, & Castillo-Palacio, 2024). Moreover, in countries such as Colombia, coffee growing has historically functioned as a “buffer” against armed conflicts by offering legitimate income alternatives to rural populations (Federación Nacional de Cafeteros de Colombia, FNC, 2023).

Despite its importance, the sector faces multiple challenges, including price volatility, climate change, land-use issues, and restricted access to small-scale technology. Additional impediments exist regarding value-added generation and capital access for activities such as crop renewal, fertilizer purchase, infrastructure enhancement, and machinery acquisition (Wamalwa, Marwa, & Nanziri, 2024). Regarding access to working capital, statistics indicate that fewer than 40% of smallholder coffee farmers have access to formal credit lines (World Bank, 2022). In several countries, including Colombia, many coffee farmers prefer informal financing strategies, such as selling the harvest in advance (i.e., “futures”) or purchasing inputs on credit (Rodríguez-Camayo

et al., 2025). While these options alleviate immediate liquidity constraints, they often involve higher costs than formal credit (Casaburi and Reed, 2022).

The relevance of agricultural credit becomes even more evident when analyzing its effect on productivity. Several studies indicate that producers with access to financing perform better than those relying solely on their own resources (Ambler et al., 2023). In Ethiopia, Tamirat and Tadele (2024) found that access to credit significantly affected coffee production. Similarly, in Brazil, Ferreira et al. (2017) documented an effect of credit on coffee production, and positive results were also reported in Kenya (Wamalwa, Marwa, & Nanziri, 2024). This advantage is explained by the possibility of acquiring quality fertilizers, adopting more resistant genetic varieties, and hiring skilled labor during critical cultivation stages. Consequently, the profitability of credit tends to exceed its financial cost (Sabasi, Shumway, & Kompaniyets, 2021). Nevertheless, credit alone does not guarantee improved incomes; it must be complemented by technical assistance and access to value-added markets.

In rural areas, the financing gap is not exclusively due to limited supply. The Colombian government has promoted special credit lines and partial guarantees. Although these initiatives broaden coverage, analysis suggests that their impact is generally concentrated on medium-scale producers with greater investment capacity (Wamalwa, Marwa, & Nanziri, 2024). Ambler et al. (2023) indicated that banks are more likely to provide financing to medium and large-scale farmers than to smallholders. This bias is partly due to agriculture being perceived as a high-risk sector, given income seasonality and weather volatility. As a result, financial institutions

impose stringent conditions that often exceed the capacity of smallholders. The absence of a verifiable credit history further exacerbates the problem, creating a vicious cycle: without access to credit, productivity remains low; consequently, the liquidity needed to meet financial commitments cannot be generated (Ouattara et al., 2020).

Beyond supply constraints, the financing gap arises from a complex web of barriers (Paiva, Ribeiro & Coutinho, 2020). Evidence categorizes these into four groups. First, socio-demographic characteristics, such as age, education level, household size, and agricultural experience, influence the propensity to incur debt by shaping risk tolerance and financial management ability (Balaine et al., 2023). Second, production-related aspects, such as farm size, productivity, crop diversification, and quality certifications, affect both credit demand and lenders' willingness to grant financing (Grabs, 2020). Third, institutional variables, such as proximity to bank offices, quality of road infrastructure, and participation in producer organizations, have been associated with a narrowing of the financial gap; associativity strengthens bargaining power and facilitates economies of scale in loan processing (Cancino, Rubiños, & Vargas, 2022). Finally, psycho-cultural factors such as trust in financial institutions, perception of fairness in credit conditions, and social norms regarding indebtedness have also been linked to the financing gap (De la Cuesta-González et al., 2021).

These factors do not act independently but are interrelated through positive or negative feedback mechanisms. For example, cooperative membership can improve access to services, enhance productivity, and strengthen repayment capacity, thereby increasing mortgage solvency and generating a "virtuous circle" of investment (Wardhiani et al., 2023). Conversely, low productivity can signal poor profitability, increasing lenders' perception of risk and creating credit-constrained environments (Lane, 2024).

This study contributes to the discussion by conducting an empirical analysis aimed at identifying the relative influence of various groups of variables on the likelihood of credit access among smallholder coffee farmers in Colombia. A key contribution lies in addressing the limited empirical evidence available for Latin America (Naranjo, Pieters & Alpízar, 2019), as most research has concentrated on Asia and Africa (Chandio et al., 2020; Dube, Mariga & Mrema, 2015; Khatun, 2019; Kiros & Meshesha, 2022; Saqib et al., 2016; Yeasmin et al., 2024). Furthermore, few studies have simultaneously considered a broad range of explanatory variables; most have been restricted to a limited set of factors.

2 MATERIAL AND METHODS

The information used in this study was obtained from an omnibus survey administered to 237 coffee producers

located in the municipalities of Socorro, Valle de San José, El Páramo, and Pinchote, in the department of Santander. The region was selected due to its widely recognized national prominence as a coffee producer. Furthermore, its diverse production systems and strong coffee-related dynamism make it a nationally representative area. In fact, it is estimated that the study region comprises about 50,000 hectares planted with coffee (FNC, 2025). For the application of the producer survey, a simple random sampling approach was employed. Assuming $p = q = 0.5$ and expecting a confidence interval of 95%, the maximum margin of error was taken as 6.5%. The survey did not solicit personal variables at any point, and all information collected was treated in an aggregated and confidential manner. Before the survey was administered, farmers provided informed consent and were allowed to withdraw from the study at any time. The socio-demographic characteristics of the sample are presented in Table 1.

Table 1: Socio-demographic characteristics of the sample.

Characteristic	Percentage
Gender	
Female	44.3%
Male	55.7%
Civil status	
Single	20.7%
Married	68.4%
Widowed / Divorced	11.0%
Level of education	
No formal education	11.8%
Primary	61.2%
Secondary	16.5%
Technician/technologist	5.5%
University	5.1%
Income range (average)	
Less than COP 1,000,000	34.2%
Between COP 1,000,000 and COP 2,000,000	58.7%
More than COP 2,000,000	7.2%
Age (average in years)	52.4 (sd = 16.3)

In order to identify the determinants of farmers' access of credit, a binary logistic regression was conducted. In binary logistic regression, the dependent variable is binomial, and the independent variables can be qualitative or quantitative. Since one of the survey questions was designed to capture the use (G1) or non-use (G0) of agricultural credit by coffee farmers, this variable became the dependent variable in the regression model. The proposed model was:

$G1$ = Farmers who have opted for agricultural credit,

$G0$ = Farmers who have not opted for agricultural credit; in this sense,

$$P(G1/G0) = 1/(1 + e^{-Z_i})$$

where Z_i corresponds to a linear model given by;

$$Z_i = a + b_1 \text{Marital_status}(1) + b_2 \text{Marital_status}(2) + b_3 \text{Years_coffee.growing}(1) + \dots + b_n x_{ni}$$

where;

a = constant of the model,

b_n = is the coefficient associated with each variable x ,

x_{ni} = explanatory variables x_n ,

i = corresponds to each of the observations

The independent variables included in the model were those that have previously been shown to be related to the dependent variable following a series of bivariate analyses, including Chi-square test, and Student's test. On the other hand, variables justified by the literature review or by practical insights from coffee cultivation were also incorporated. In a similar case study, Dube, Mariga and Mrema (2015), Ololade and Olagunju (2013) and Yeasmin et al. (2024) also employed a binary logistic regression model.

According to Benos et al. (2022), based on the behavioral aspect, the variables can be classified into three categories: i) person-related variables; ii) farm-related variables; iii) variables that are related to attitudes, perceptions, and motivations towards agricultural credit. Among the former, gender, marital status, the farmer's educational level, monthly income range, length of experience in coffee farming, number of dependents, and age were included. These variables have consistently been demonstrated to be relevant in previous studies (Chandio et al., 2020; Kiros & Meshesha, 2022; Mitra & Prodhon, 2018; Ololade & Olagunju, 2013). Farm-related variables included farm size, amount of coffee production, and total number of employees involved in coffee farming. The third category of variables included awareness of financing options, level of satisfaction with financing options, participation in training programs, and perception of the impact of financing on farm performance, all of which were considered to exert a positive effect on access to credit. These variables were measured using ordinal scales. The specifications of the variables included in the initial model are presented in Table 2.

For the construction of the final model, the backward elimination method using the Wald statistic was applied. All variables were included in a single block and then, based on changes in the log-likelihood, variables with lower explanatory power were automatically excluded. For the selection of the final model, criteria such as Nagelkerke's R^2 , the classification table, and Hosmer and Lemeshow's test were considered. Finally, the Wald method was used to

select the most significant variables. Also, in order to ensure the non-existence of multicollinearity among the dependent variables at a level that could affect the results, a CATPCA was additionally carried out corroborating the non-existence of multicollinearity.

3 RESULTS

The most significant variables that discriminate between farmers who have opted for some type of financing (Group $G1$) and those who finance their activity using their own financial resources (Group $G0$) are presented in Table 3. The logistic regression model developed exhibits an overall accuracy of 96.5%. Furthermore, Nagelkerke $R^2 = 0.896$ and a Hosmer and Lemeshow test with $p\text{-value} \geq 0.050$ indicate a good fit for the model.

As shown in Table 3, the variables $\text{Marital_status}(2)$, $\text{Ext_farm}(1)$, $\text{Bags_produced2023}(1)$, $\text{Impact_credit.perfor}$, S_opci.credit , and $\text{Part_program.trainin}$ have a significant effect on the probability of observing $G1$ versus $G0$. Therefore, these variables could be considered determinants of coffee farmers' access to credit, at least within the context of this study. In contrast, $\text{Marital_status}(1)$, $\text{Years_coffee.growing}$, $\text{Ext_farm}(2)$, $\text{Ext_farm}(3)$, $\text{Bags_produced2023}(2)$, and A_credit.option have no significant effect on the probability of observing $G1$ versus $G0$.

4 DISCUSSION

This study, conducted in a region that is widely recognized as a major coffee-producing area in Colombia, aimed to identify determinants of agricultural credit access among farmers. A total of 237 coffee producers were surveyed, and a binary logistic regression analysis was employed to identify these determinants. Of the surveyed farmers, 38.2% had used some form of financing (Group $G1$), while the remaining 61.8% operated using only their own financial resources (Group $G0$). In a study carried out in Colombia with small farmers, Diaz et al. (2022) reported that around 30% of farmers had been beneficiaries of agricultural credit, findings that are highly consistent with this study.

Although Yeasmin et al. (2024) and Tique and Barrientos (2023) found a significant effect of farmer experience on the demand for agricultural credit, this variable was not identified as a determinant in our study. This could be attributed to the fact that the vast majority of surveyed farmers (86.1%) had been farming for more than 15 years. Coffee growing in the region is one of the most traditional agricultural activities, dating back centuries.

Table 2: Specification of the variables included in the model.

Variable	Variable code	Description
Person-related aspects		
Gender	Gender	0= Female; 1= Male
Civil status	Marital_status(1)	0= Single; 1= Married
	Marital_status(2)	0= Single; 1= Widowed /Divorced
Educational level	Educational_level(1)	0= No formal education; 1=Primary
	Education_level(2)	0= No formal education; 1= Secondary
	Education_level(3)	0 = No formal education; 1 =Technician/technologist
	Education_level(4)	0 =No formal education; 1 =University
Monthly income range	Income(1)	0 = < COP 1,000,000; 1 = Between COP 1,000,000 and COP 2,000,000
	Income(2)	0 = < COP 1,000,000; 1 = More than COP 2,000,000
Years of experience in coffee farming	Years_coffee.growing(1)	0 = < Less than 5 years; 1 = Between 5 and 10 years
	Years_coffee.growing(2)	0 = < Less than 5 years; 1 = Between 11 and 15 years
	Years_coffee.growing(3)	0 = < Less than 5 years; 1 = More than 15 years
Number of dependents	Dependents	Number of dependents
Age	Age	Age in years of the farmer
Farm-related aspects		
Farm size	Ext_farm(1)	0 =Less than 1 ha; 1 = Between 1 and 5 ha
	Ext_farm(2)	0 =Less than 1 ha; 1 = Between 6 and 10 ha
	Ext_farm(3)	0 =Less than 1 ha; 1 =More than 10 ha
Coffee production volume	Bags_produced2023(1)	0 = Less than 10 bags; 1 = Between 10 and 50 bags
	Bags_produced2023(2)	0 = Less than 10 bags; 1 = More than 50 bags
Number of employees	No_employees [§]	Number of employees owned on the farm
Attitudes, Perceptions/ Motivations towards access to finance		
Awareness of information	A_credit.option [§]	Awareness of credit options - measured through an ordinal scale
Impact of credit	Impact_credit.perfor [§]	Perceived impact of credit on farm performance - measured on an ordinal scale
Satisfaction with options	S_opci.credit [§]	Level of satisfaction with credit options - measured on an ordinal scale
Participation in training programs	Part_program.trainin [§]	Participation in training programs - measured on an ordinal scale

Note: [§]Quantitative variables included in the model.

The positive value of the coefficient for Marital_status(2) indicates that being widowed or divorced, compared to being single, increased the probability of a coffee farmer opting to finance their crop. This could be because widowed or divorced farmers might be perceived as more responsible borrowers (Tique & Barrientos, 2023). In Colombia, Tique Calderón and Barrientos Fuentes (2023) found that single farmers were less likely to access formal credit. Similarly, in Nigeria, Ololade and Olagunju (2013) reported that single farmers tended to have less access to credit. It is likely that married farmers, compared to single farmers, tend to avoid informal loans to a greater extent and place a higher value on formal credit. This may ultimately translate into a more limited range of available options for them (Dube, Mariga & Mrema, 2015), which could help explain the negative values obtained for the coefficient associated with Marital_status(1).

Although it might be assumed that larger crop size demands greater resources and therefore would increase demand for credit (Chandio et al., 2020). In the present study, and similar to Dube, Mariga and Mrema (2015) in Zimbabwe, we did not identify cultivated area as a determinant of farmers' access to credit. While the positive sign of the coefficient for Ext_farm(3) aligns with findings from previous studies (Chandio et al., 2020; Khatun, 2019; Yeasmin et al., 2024), it is evident that the dynamics of coffee farming in Colombia, at least in the study area, are centered on small-scale farmers.

Of the surveyed farmers, 59.1% owned between 1 and 5 ha, and 28.7% owned less than 1 ha. The negative coefficient for Ext_farm(1) suggests that farmers with farm sizes between 1 and 5 ha tend to access less agricultural credit compared to those with less than 1 ha, who tend to access more. These results are consistent with the finding reported by Karyani et al. (2024) in Indonesia. This could be due to self-exclusion

among larger farmers (within the small-scale group); even if they have access to credit, they may not use it because they do not consider it necessary (Tique & Barrientos, 2023). Another reason could be gender-related. Women operating smaller production areas are more likely to obtain alternative formal sources of finance, such as state aid and microfinance (Tique & Barrientos, 2023). This is primarily because rural women in developing countries face greater constraints in accessing financial resources (Kiros & Meshesha, 2022). It is also noteworthy that, similar to Saqib et al. (2016) in Pakistan, the present study identified that larger farmers tend to use banks as credit sources, perhaps because of their status or their ability to provide more collateral and secure larger amounts of credit. Larger farm size may indeed provide them with greater collateral (Khatun, 2019).

Regarding the variable Bags_produced2023(1), the positive values indicate that farmers producing between 10 and 50 bags are more likely to access credit for their crops than those producing fewer than 10 bags. This could be due to payment capacity, indebtedness, or access to financing instruments (Tique & Barrientos, 2023; Yeasmin et al., 2024). We found that farmers producing between 10 and 50 bags tend to have greater access to credit through banks (Chi-square test, $p\text{-value} = 0.000$). Conversely, farmers producing

fewer than 10 bags tend to rely more on microfinance institutions (Chi-square test, $p\text{-value} = 0.031$). Yeasmin et al. (2024) highlighted that higher productivity among smallholder farmers correlated with greater access to agricultural credit, aligning well with our findings. Similarly, Tique and Barrientos (2023) in Colombia identified that productive units with higher incomes were more predisposed to access credit.

The positive effect of the perceived impact of external financing on coffee farming performance (indicated by the positive sign of the Impact_credit.perfor variable) is also noteworthy. The greater the perception that financing influences the economic performance of coffee farming, the more likely it is that the farmer has opted for external financing. Kiros and Meshesha (2022), in a study conducted in Ethiopia, found that attitude towards rural credit was not a determinant of farmers' access to credit. In contrast, Dube, Mariga and Mrema (2015) reported that attitudes towards rural credit were a determinant of access, a finding consistent with those obtained in the present study. Formal agricultural credit has been shown to be an important tool for improving production and farm conditions in general, which in the long run can motivate farmers who perceive its benefits (Chandio et al., 2020).

Table 3: Logistic regression model: final variables included in the model.

Variables	B	E.T.	Wald	Sig. [¥]
<i>Person-related aspects</i>				
<i>Civil status</i>				
Marital_status(1)	-0.970	1.155	0.705	0.401
Marital_status(2)	2.423	1.408	2.962	0.085*
<i>Years of experience in coffee farming</i>				
Years_coffee.growing(1)	-2.862	1.945	2.166	0.141
Years_coffee.growing(2)	-2.904	2.096	1.920	0.166
Years_coffee.growing(3)	-0.348	1.509	0.053	0.818
<i>Farm-related aspects</i>				
<i>Farm size</i>				
Ext_farm(1)	-2.674	1.317	4.119	0.042**
Ext_farm(2)	-2.959	3.109	0.906	0.341
Ext_farm(3)	14.185	12218.757	0.000	0.999
<i>Coffee production volume</i>				
Bags_produced2023(1)	2.386	1.102	4.691	0.030**
Bags_produced2023(2)	3.502	2.952	1.407	0.235
<i>Attitudes. Perceptions/ Motivations towards access to credit</i>				
A_credit.option	1.000	0.626	2.555	0.110
Impact_credit.perfor	5.379	1.106	23.634	0.000***
S_opci.credit	1.880	0.820	5.257	0.022*
Part_program.trainin	1.483	0.786	3.558	0.059*
Constant	-12.723	3.507	13.161	0.000***

[¥]Significance corresponds to the Wald statistic. *Significance at 0.1, **significance at 0.050, ***significance at 0.010.

Additionally, the higher a farmer's satisfaction with available credit options (positive sign of the *S_opci.credit* variable), the more likely they are to have opted for crop financing. In this regard, Yeasmin et al. (2024) found that when farmers perceive the credit access process as straightforward, there is a greater likelihood that they will utilize credit.

Moreover, increased farmer participation in financial training programs correlates with a greater likelihood of opting for credit in coffee farming. This is reflected in the positive coefficient of the *Part_program.trainin* variable. When farmers perceive that application processes are easy and understand the procedures, they are more motivated to apply for formal loans (Tique & Barrientos, 2023). Conversely, complex and problematic processes reduce the likelihood of access (Yeasmin et al., 2024). Therefore, these results highlight the need to implement training programs on credit application procedures, along with the development of simplified processes (Tique & Barrientos, 2023).

In summary, the results of this study reveal a complex interaction between structural, perceptual, and organizational factors that determine access to credit in Colombian coffee farming. Particularly noteworthy is the finding that only 25.8% of the surveyed producers use formal financing mechanisms. In coffee farms in Valle del Cauca (Colombia), Rojas-Ospina, Zuñiga-Collazos, and Castillo-Palacio (2024) highlighted that access to credit improves agricultural management and, in turn, impacts the sustainability of coffee farms.

The importance of perceptual aspects, particularly the positive appraisal of the impact of financing and satisfaction with available options, is corroborated by Moreno and Aguilar's (2024) study on knowledge management in Panamanian coffee communities. Their research shows that 84% of coffee farmers aged 22–42 years are skilled in using digital tools and that 100% are willing to share knowledge, suggesting an inherent receptiveness to innovation and collaborative learning. This technological and social predisposition could serve as a facilitating factor for the development of more effective financial literacy programs. In addition, it is also important to note that producers who access credit not only improve their immediate productive capacity but are also better positioned to implement sustainable practices. In the long term, such practices can generate competitive advantages in differentiated markets. The knowledge management documented by Moreno and Aguilar (2024) reinforces this perspective.

Finally, it can be argued that the dynamics of coffee production in the study area, which is dominated by smallholder farmers, make some of the results unique and somewhat divergent from findings of other studies.

5 CONCLUSIONS

Variables such as marital status, farm size, productivity, and perceptual aspects were identified as determinants

of farmers' access to agricultural credit. Greater farming experience, larger landholdings, and higher production are not necessarily conditions for accessing credit. This study also highlights the significant role of satisfaction with available credit options, the perceived impact of financing, and participation in financial literacy programs as key determinants of credit access.

6 AUTHORS' CONTRIBUTIONS

Conceptual Idea: Castañeda, W.M.; Methodology Design: Meza, L.J.; Mosquera, J.; Data collection: Castañeda, W.M.; Data analysis and interpretation: Castañeda, W.M.; and Writing and editing: Castañeda, W.M.

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8 DATA AVAILABILITY STATEMENT

Data available upon request to authors.

9 REFERENCES

- Ambler, K. et al. (2023). Viewpoint: Finance needs of the agricultural midstream. *Food Policy*, 121:102530.
- Balaine, L. et al. (2023). Extension and management pathways for enhanced farm sustainability: Evidence from Irish dairy farms. *European Review of Agricultural Economics*, 50(2):810-850.
- Benos, T. et al. (2022). When mindful consumption meets short food supply chains: Empirical evidence on how higher-level motivations influence consumers. *Sustainable Production and Consumption*, 33:520-530.
- Cancino, N., Rubiños, C., & Vargas, S. (2022). Social capital and soil conservation: Is there a connection? Evidence from Peruvian cocoa farms. *Journal of Rural Studies*, 94:462-476.
- Casaburi, L., & Reed, T. (2022). Using individual-level randomized treatment to learn about market structure. *American Economic Journal: Applied Economics*, 14(4):58-90.
- Chandio, A. A. et al. (2020). Determinants of demand for credit by smallholder farmers': A farm level analysis based on survey in Sindh, Pakistan. *Journal of Asian Business and Economic Studies*, 28(3):225-240, 2020.

- De La Cuesta-González, M. et al. (2021). The relationship between vulnerable financial consumers and banking institutions: A qualitative study in Spain. *Geoforum*, 119:163-176.
- Diaz, T. R. et al. (2022). Socioeconomic determinants that influence the agricultural practices of small farm families in northern Colombia. *Journal of the Saudi Society of Agricultural Sciences*, 21(7):440-451.
- Dube, L.; Mariga, T.; Mrema, M. (2015). Determinants of access to formal credit by smallholder tobacco farmers in Makoni District, Zimbabwe. *Greener Journal of Agricultural Sciences*, 5(1):34-42.
- Federación Nacional de Cafeteros de Colombia - FNC (2023). *Annual Report2023*. Available in: <<https://www.federaciondecafeteros.org>>.
- Federación Nacional de Cafeteros de Colombia – FNC. (2025). Statistics. Available in: <https://www.federaciondecafeteros.org>
- Ferreira, D. M. A. et al. (2017). Influence of economic factors in offer coffee of São Paulo State. *Coffee Science*, 12(3):410-418.
- Grabs, J. (2020). *Selling sustainability short? The private governance of global coffee*. Cambridge University Press.
- Karyani, T. et al. (2024). Factors affecting coffee farmers' access to inancial institutions: The case of Bandung Regency, Indonesia. *Open Agriculture*, 9:20220297.
- Khatun, M. N. (2019). What are the drivers influencing smallholder farmers access to formal credit system? Empirical evidence from bangladesh. *Asian Development Policy Review*, 7(3):162-170.
- Kiros, S., & Meshesha, G. (2022). Factors affecting farmers' access to formal financial credit in Basona Worana District, North Showa Zone, Amhara Regional State, Ethiopia. *Cogent Economics & Finance*, 10:2035043.
- Lane, G. (2024). Adapting to climate risk with guaranteed credit: evidence from Bangladesh. *Econometrica: Journal of the Econometric Society*, 92(2):355-386.
- Mitra, S., & Prodhan, M. M. H. (2018). Factors determining credit access of tomato farmers in a selected Area of Bangladesh. *National Journal of Multidisciplinary Research and Development*, 3(1):406-410.
- Moreno, O., & Aguilar, J. R. (2024). Towards a knowledge management system for the strengthening of coffee production: A case study in the Panama Canal Basin, Panamá Oeste province. *Green Technologies and Sustainability*, 2:100056.
- Naranjo, M. A., Pieters, J., & Alpízar, F. (2019). Credit, insurance and farmers' liability: Evidence from a lab in the field experiment with coffee farmers in Costa Rica. *Journal of Economic Behavior & Organization*, 166:12-27.
- Ololade, R. A., & Olagunju, F. I. (2013). Determinants of access to credit among rural farmers in Oyo State, Nigeria. *Global Journal of Science Frontier Research*, 13(2):17-22.
- Ouattara, N. B. et al. (2020). Determinants of smallholder farmers' access to microfinance credits: A case study in Sassandra-Marahoué District, Côte d'Ivoire. *Agricultural Finance Review*, 80(3):401-419.
- Paiva, T., Ribeiro, M., & Coutinho, P. R. D. (2020). Collaboration, competitiveness development, and open innovation in SMEs. *Journal of Open Innovation: Technology, Market, and Complexity*, 6(4):116.
- Pinto, L. F. G. et al. (2014). Group certification supports an increase in the diversity of sustainable agriculture network-rainforest alliance certified coffee producers in Brazil. *Ecological Economics*, 107:59-64.
- Rodriguez-Camayo, F. et al. (2025). Understanding coffee farmers' poverty, food insecurity and adaptive responses to climate stress. Evidence from western Honduras. *Climate Risk Management*, 49:100735.
- Rojas-Ospina, A., Zuñiga-Collazos, A., & Castillo-Palacio, M. (2024). Factors influencing environmental sustainability performance: A study applied to coffee crops in Colombia. *Journal of Open Innovation: Technology, Market, and Complexity*, 10(3):100361.
- Rubio-Jovel, K. et al. (2024). SDGs trade-offs associated with voluntary sustainability standards: The case of coffee in Costa Rica. *Sustainable Development*, 32(1):917-939.
- Sabasi, D., Shumway, C. R., Kompaniyets, L. (2021). Analysis of credit access, U.S. agricultural productivity, and residual returns to resources. *Journal of Agricultural and Applied Economics*, 53(3):389-415.
- Saqib, S. E. et al. (2016). Landholding size and farmers' access to credit and its utilisation in Pakistan. *Development in Practice*, 26(8):1060-1071.
- Tamirat, N., & Tadele, S. (2024). Factors affecting coffee farmers' production in Jimma Zone, Southwest Ethiopia. *Coffee Science*, 19:e192213.
- Tique, E. J., & Barrientos, J. C. (2023). Determinants of agricultural credit among dairy farmers in Colombia. *Economía Agraria Y Recursos Naturales - Agricultural and Resource Economics*, 23(2):61-90.

- Wamalwa, R. W., Marwa, N., & Nanziri, E. (2024). Impact of agricultural credit on coffee productivity in Kenya. *World Development Sustainability*, 5:100166.
- Wardhiani, W. F. et al. (2023). The effect of performance on the sustainability of coffee farmers' cooperatives in the industrial revolution 4.0 in West Java Indonesia. *Sustainability*, 15(6):4901.
- World Bank. (2022). *Financial inclusion in rural Colombia: Progress and challenges*. World Bank Publications.
- Yeasmin, S. (2024). Factors influencing demand for, and supply of, agricultural credit: A study from Bangladesh. *Journal of Agriculture and Food Research*, 16:101173.