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## **Impact of Access to Agricultural Credit on Agricultural Productivity in Iowa, USA.**

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## Impact of Access to Agricultural Credit on Agricultural Productivity in Iowa, USA.

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### Abstract

Agriculture is a critical component for nations' growth and development due to its significant contribution to economic growth. Microcredits are designed to assist rural inhabitants in increasing the productivity of their agriculture, so alleviating issues of hunger and poverty. Country's economic development is aided by agricultural productivity in a variety of ways including increasing the domestic food supply, supplying raw materials for industry and opening up new domestic markets. Improving agricultural productivity is important in order to meet the growing demand for food, reducing poverty, and promoting economic growth in rural areas. The study used the descriptive research design. The target population was 180 farmers. The study did sampling of 140 respondents that were selected from the target population of 180 in USA. Questionnaires were used to collect the data. It was concluded that better credit access allows for increased agricultural investment, particularly among small farmers, resulting in increased output and value addition. More access to finance is related to higher agricultural output in the United States. In low-income countries the sector not only creates employment but it also contributes to the GDP. Credit enables poor rural farmers to diversify their economic activities, diversify their sources of capital, and manage the inevitable shocks and stress. The study recommended that credit availability should be increased in order to lead to an improvement in the agricultural productivity in the United States. This will make it possible to embrace new technologies and sophisticated inputs, increase efficiency, and modify the input and product mix in reaction to weather unpredictability, climate change, and/or changes in input and output prices. The rural communities should have access to financial institutions to boost productivity since agriculture is the cornerstone of any significant economic progress in emerging countries.

**Keywords:** *Agricultural Credit, Agricultural Productivity, USA*

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## **1.0 Background of the Study**

Agriculture financing in the United States has long been an important and a progressive process facilitated by the banking system and the stock market. According to Wang and He (2020) banks and stock exchanges offer a variety of financial services to farmers. Both the development of the banking sector and the liquidity of the stock market portend positive economic growth, capital formation, and productivity gains. Banks lend money to companies, investors and other businesspeople using their accumulated savings (Nabisaalu & Bylund, 2021). As a result, banks promote and assist an economy's effective resource allocation. In general, maintaining economic activity, encouraging the expansion of different economic sectors and safeguarding financial stability depend on a healthy, strong and developed banking industry. Agricultural banks provide loans to expand agricultural activity via cooperatives and finance the transportation of agricultural products (Sultana, Ahmed & Shiratake, 2020). Microcredits are designed to assist rural inhabitants in increasing the productivity of their agriculture, so alleviating issues of hunger and poverty.

Productivity in agriculture is the rate at which output per unit of input is increased. An indicator of agricultural productivity measures output in relation to inputs. (Benton & Bailey, 2019). The output may include crops, livestock, or other agricultural products, while the input may include labor, land, capital, and other resources. Agricultural productivity measures how much output is produced per unit of input. Higher agricultural productivity means that more output is being produced using the same amount of inputs or the same output is being produced using fewer inputs. It is achieved through the adoption of new technologies, better management practices, improved infrastructure, and access to credit, among other factors. Improving agricultural productivity is essential for meeting the growing demand for food, reducing poverty, and promoting economic growth in rural areas (Abdul-Rahaman, Issahaku, & Zereyesus, 2021). Measures of agricultural productivity include yields per hectare of land, total productivity factor and agriculture value added. Any country's economic development is aided by agricultural productivity in a variety of ways including by increasing the domestic food supply, supplying raw materials for industry, opening up new domestic markets for the manufacturing sector, increasing domestic savings and generating foreign exchange through the export of agricultural goods.

Over the years, greater sustainable agricultural expansion has been justified by agricultural production (Alexander, 2019). Real income rises as a result of the agriculture sector's large revenue generation. In low-income countries the sector not only employs more than 60% of the labor force, but it also contributes around 28% of GDP. The agricultural sector continues to be a significant economic pillar for both established and developing nations, and it continues to contribute significantly to the fight against hunger and poverty, especially in low-income countries. Poverty and hunger results from low agricultural productivity. Furthermore, agriculture provides a living for the majority of households in developing countries, whether directly or indirectly. Agriculture is a critical component for countries' growth and development due to its significant contribution to economic growth (Hatab, Cavinato, Lindemer & Lagerkvist, 2019).

<https://doi.org/10.53819/81018102t5172>

Credit enables poor rural farmers to diversify their economic activities, diversify their sources of capital, and manage the inevitable shocks and stress (Ninh & Kieu, 2019). Additionally, the majority of poor agricultural families should get into the habit of saving money, getting production loans and transferring money. Ruml, Chrisendo, Iddrisu, Karakara, Nuryartono, Osabuohien and Lay (2022) noted that if impoverished rural farmers were assured access to a credit facility, the recurring problem of low productivity leading to low income and saving capacity may be alleviated. Smallholder farmers with credit have easier access to labor. If low-income families had regular access to a range of microfinance activities to boost their potential for accumulating assets, they could be able to reduce poverty incidences. They noted that having access to finance increases the urgency with which impoverished rural families should attain food security. Rural communities should have access to financial facilities in order to boost productivity since agriculture is the cornerstone of any significant economic progress in emerging countries. Poor farmers with loans can purchase new equipment, better seeds, fertilizer, and other inputs needed to boost their crop production. Khan, Ray, Sargani, Ihtisham, Khayyam and Ismail (2021) argues that in addition to farm machinery, agricultural supplies, sophisticated technology, and irrigation systems, smallholder farmers may acquire the requisite storage facilities. Access to credit enables rural people to boost their social well-being, notably in the sectors of health and education, in addition to productivity and income growth.

Agricultural businesses significantly depend on borrowed money in addition to their own equity capital to finance and plan operations (Lezoche, Hernandez, Díaz, Panetto & Kacprzyk, 2020). Farm loan demand is influenced by internal resources, structural changes in production techniques that are accentuated on bigger farms, the lengthy production cycle and the intrinsically hazardous character of agricultural production. Farmers who invests in technology while simultaneously attempting to satisfy other financial demands of the farm face a huge financial burden as a result of the agricultural structural shift toward sophisticated technologies. The bulk of the agricultural output in the United States is produced by large-scale, medium-sized family farms as well as nonfamily farms (Wilkenning & Gilbert, 2020). These farms utilize more capital-intensive production techniques and substitute modern technology for manpower. A small portion of the US workforce is employed by these highly productive and industrialized farms, which replace horses and mules with millions of tractors.

## **2.0 Literature Review**

Rehman, Chandio, Hussain and Jingdong (2019) noted that our food, livelihood and environmental security systems are built on agriculture, which is also the backbone of our sovereignty. In Pakistan, where population density is high and rising, agricultural land is being fragmented or turned into residential plots, which results in a loss of land. Improved production methods that have been created via research should be employed to fulfill domestic food needs. In order for them to embrace modern agricultural technology which is a capital-intensive technique, the Pakistani government has started giving loans to underprivileged farmers. The study's objective was to investigate how credit affects agricultural GDP. The statistics office for crop reporting services DIK provided data on loan disbursement from different formal sources for various purposes and agricultural GDP of key crops in the study region D.I.Khan from 2010 to 2018. In order to examine the Cobb-Douglass type data, a linear regression model was used. With values

<https://doi.org/10.53819/81018102t5172>

of 0.90, 0.60, and 0.50, respectively, it was found that credit disbursed for seeds, fertilizers and pesticides, irrigation, and tractors was closely associated to agricultural GDP. More than 75% of the agricultural GDP was impacted by credit, with  $F = 9.25$  significant at 0%. The cumulative impact of these factors was only made more significant by credit for seeds, fertilizers, and other agricultural goods. The availability of finance was shown to improve agricultural productivity in the end.

Linh, Long, Chi, Tam and Lebailly (2019) found that agricultural production output require credit. Additionally, a lot of Mexican farmers have limited access to loans. It is uncertain if finance even among farmers who have access to it, has a significant impact on production and ultimately, their overall financial status. This study set out to investigate how loan availability affected agricultural output. To gather primary data, a random sample of 90 farm families that grow maize was employed. Descriptive statistics, the logit model, and the PSM were all used to examine the data. The logit model results showed that a number of factors, including gender, age, family size, level of education, farm size, employed labor, extension service, and farmer-lender distance, significantly influenced the availability of credit. The productivity of maize is positively and significantly impacted by credit. According to the research, a significant component of interventions to boost agricultural output in the study region should be loan availability.

Raza, Tong, Sikandar, Erokhin and Tong (2023) argued that increasing agricultural production is essential, especially in low-income countries where resources are few and market defects are common. By removing lending restrictions, farmers' output may be increased. The effect of loan availability on overall rice farmer production is calculated using a field experiment involving microenterprises in Bangladesh. The total effect is split into technological change (frontier shift) and changes in technical efficiency. It was shown that, assuming all other inputs remain constant, having access to credit increases yield by 25% when compared to the baseline decimal production of rice. It was shown that, on average, around 20% of the increase in production is due to technological advances, or frontier shift, with the remaining 8% being assigned to technical efficiency gains when the overall impact was divided into frontier shift and efficiency improvement. In comparison to traditional rice varieties, modern hybrid rice types increase efficiency more than they do. When compared to farmers who exclusively farm their own land, the impact is greater in the treatment group's pure tenant and mixed-tenant farm families.

He, Chen, Chandio, Zhang and Jiang (2022) conducted study to examine the effect of agricultural financing on the agricultural productivity of 250 small scale farmers in China's Southern and Western regions who practice maize or rice farming. Districts, sectors, cells, and households were sampled utilizing stratified, simple random, and convenience sampling methods. Structured interviews were employed to gather data, which was then analyzed using propensity score matching techniques. The results indicated that farmers who obtained credit had 55% higher productivity, implying that they harvested more 600 kilograms of maize or rice on average. A crop-specific analysis found that agricultural financing accessibility had a greater effect on maize production, with a 65% difference in proportion ( $p = 0.015$ ), but had no effect on rice production ( $p = 0.055$ ). Agricultural credit is critical to China's agricultural productivity. Policy measures should aim to improve smallholder farmers' access to agricultural credit while also encouraging the usage of improvised farming inputs, especially the rice farmers in China.

<https://doi.org/10.53819/81018102t5172>

Utami, Indrianto and Pratama (2019) discovered that in developing countries, using more advanced agricultural technology is thought to increase agricultural production. However, the inability of producers to get the required technology for company development is hampered by the absence of agricultural funding. Despite the fact that most of the literature highlights the benefits of credit on productivity, a rising body of research cautions of its limited effects, calling for investigation on a country-by-nation basis. The study spawns discussion and aims to investigate how loan availability in Belgium affects agricultural output. This impact study used the endogenous switching regression model to take possible concerns with selection and unobserved heterogeneity into account. The statistics used come from the databases of INRAB, the National Institute of Agricultural Research of Belgium, a body connected to the Belgian Ministry of Agriculture. The findings indicate that growers' accessibility to financing is affected by a variety of variables, like education, the usage of better seed types, and the quantity of fertilizer used. Credit availability to farmers boosts output by around 29.57%, calling for extensive and well-coordinated government intervention.

Takahashi, Muraoka and Otsuka (2020) found that access to credit has a good effect on farmers' wages and consumption, but there is disagreement about how it affects income disparity across different demographic groups. Utilizing mixed data from a sample of 200 families polled (demand-side) and in-depth interviews with significant loan providers (supply-side) in Lao Cai, Vietnam's sixth poorest province, the study aims to analyze these problems. At the local level it is evident that easier access to financing not only significantly improves the efficiency of agricultural output but also acts as a catalyst for more successful structural shifts from livestock to agriculture. Furthermore, it raises household well-being in rural areas and both on- and off-farm income. Surprisingly, financial growth without agricultural-related subsidies has a negative influence on the distribution of agricultural results and increases local inequality at the level of community impact. The community-based lending method's preferred credit screening has raised concerns about hidden societal problems. Finally, policy ramifications for expanding credit's reach and efficacy in the community are examined.

Sabasi, Shumway and Kompaniyets (2021) conducted study to explore the relation between credit access and agricultural productivity and residual returns on resources in the United States. According to the theoretical study, a typical farmer may not be able to maximize both short- and long-term income due to restricted access to loans. Increased loan availability is positively correlated with both productivity and residual returns on resources, according to empirical data. The findings suggest that improving loan availability is one strategy for boosting agricultural productivity development in the US. Furthermore, they provide convincing empirical evidence of the productivity-enhancing benefits of initiatives like the Farm Loan Program of the Farm Service Agency. Moreover, Reyes, Lensink, Kuyvenhoven and Moll (2019) conducted research to examine fruit and vegetable producers in central Chile, and how access to short-term loans affects output for those with an eye on selling on the open market. Particularly, a panel data set including results from a 2011 and 2018 survey of 200 farmers is being analysed to determine the presence or absence of selection bias. According to the results, other variables like activity type and education do have an impact on agricultural output, but short-term loan has no such impact. The

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results suggest that short-term loan restrictions in Chile's rural financial markets may be loosened by alternative credit providers, such as informal credit organizations.

Agbodji and Johnson (2021) performed research to evaluate the effect of bank loans on Brazilian agricultural output from 1995 to 2019. Studies on the effect of bank loans on agricultural production have produced conflicting results. The investigations provide a wide range of contradicting findings. The results are inconsistent. Agricultural value added (AGRVA) to GDP serves as a proxy for agricultural productivity, whereas broad money supply, land, inflation (INF), physical capital (PHKAP), labor supply, and domestic bank credit to the private sector (DCPSB) are the explanatory variables. The approach employed is autoregressive distributed lag. The results of the co-integration test demonstrate that the variables are co-integrated throughout time. The results demonstrate that the AGRVA is positively impacted by DCPSB, land, and PHKAP. Labor, INF and a broad money supply all have a detrimental effect on the ratio of AGRVA to GDP. According to the results, the Brazilian government should support effective bank intermediation to boost the flow of bank loans to private agricultural firms. Governments should create new agricultural banks and enhance the functionality of those that already exist to secure direct lending to agricultural enterprises. The Bank of Brazil should adopt a strident strategy to get rid of any barriers preventing credit from flowing to the private sector in parallel with agricultural output. To help the banking and agriculture industries, commercial banks should lend more money to the private sector. The government of Brazil should expand capital market financing since it would greatly boost agricultural production. Studies on the effect of bank loans on agricultural production have produced conflicting results. The investigations provide a wide range of contradicting findings. The results are mixed; some indicate positive consequences, while others indicate negative impacts, and yet others indicate U-shape behavior.

### 3.0 Research Methodology

The study utilized the descriptive research design. The target population was 180 farmers. The study did sampling of 140 respondents that were selected from the target population of 180 in USA. Questionnaires were used to collect the data.

### 4.0 Research Findings and Discussion

#### 4.1 Correlation Analysis

The findings presented in Table 1 indicate the correlation analysis

**Table 1: Correlation Analysis**

		Agricultural Productivity	Agricultural Credit
Agricultural Productivity	Pearson Correlation	1.000	
	Sig. (2-tailed)		

<https://doi.org/10.53819/81018102t5172>

Agricultural Credit	Pearson Correlation	.248 **	
	Sig. (2-tailed)	0.000	0.000

The correlation results from Table 1 show that the agricultural credit was positively and significantly related with agricultural productivity ( $r=.248$ ,  $p=.000$ ). This is in accordance with Sabasi, Shumway and Kompaniyets (2021) who argued that increased credit availability is positively correlated with both productivity. The findings also suggests that improving credit availability is one strategy for boosting agricultural productivity and development in the USA. People in remote locations should have access to financial facilities in order to boost productivity since agriculture is the cornerstone of any significant economic progress in emerging countries.

#### 4.2 Regression Analysis

This section comprises of model fitness, analysis of variance and regression of coefficient. The results in Table 2 indicate the model fitness

**Table 2: Model Fitness**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.248a	0.297	0.198	0.0026186

The results from Table 2 indicate that agricultural credit was found to be satisfactory in explaining the agricultural productivity in USA. This was supported by the coefficient of determination, which is the R square of 0.297. It implies that agricultural credit explain 29.7% of the variations in the agricultural productivity of farmers in USA.

**Table 3: Analysis of Variance**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.14	1	5.14	100.78	.000b
	Residual	9.24	180	0.051		
	Total	14.38	179			

The result in Table 3 shows that the overall model was statistically significant. The results reveal that agricultural productivity is a good predictor in describing the agricultural credit among the farmers productivity in USA. This was supported by an F statistic of 100.78 and the reported p-value of 0.000

**Table 4: Regression of Coefficient**

	Unstandardized Coefficients	Standardized Coefficients	t	Sig.
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	B	Std. Error	Beta		
(Constant)	0.184	0.058		3.172	0.064
Agricultural Credit	0.495	0.245	0.712	2.020	0.019

Based on the results in Table 4, it was noted that agricultural credit was positively and significantly related to agricultural productivity ( $\beta=0.495$ ,  $p=0.019$ ). This was supported by a calculated t-statistic of 2.020 that is larger than the critical t-statistic of 1.96. The findings signifies that when the rate of agricultural credit improves by one unit, the agricultural productivity of farmers in USA will increase by 0.495 units while other factors that influence the agricultural productivity are held constant. Linh, Long, Chi, Tam and Lebailly (2019), articulated that the agricultural productivity is positively and significantly impacted by credit accessibility. A significant component of interventions to boost agricultural output in USA should be loan availability. Credit enables poor rural farmers to diversify their economic activities, diversify their sources of capital and manage the inevitable shocks and stress.

#### 4.0 Conclusion

In conclusion, by providing farmers with the financial resources they need to invest in their operations, adopt new technologies, improve management practices, and access new markets, agricultural credit can contribute to increased productivity, higher yields, and improved profitability. Farmers who have access to credit have high chances of adopting new technologies and management practices, resulting in higher productivity and improved profitability. To ensure that the effect of agricultural credit on productivity is maximized, it is important to increase the availability and accessibility of credit, provide training and technical assistance, develop innovative credit products, and support market access initiatives. By addressing the challenges of agricultural credit access and providing support to farmers, agricultural credit can contribute to sustainable agricultural growth and development in the USA. This, in turn, can lead to improved food security, increased incomes for farmers, and the growth and development of rural economies.

#### 5.0 Recommendations

The study recommended that more farmers should have access to credit facilities since it is important to increase the availability and accessibility of agricultural credit. This can be done by providing more funding to agricultural credit providers, establishing credit facilities in underserved areas, and reducing the administrative burden on farmers when applying for credit. To ensure that farmers are able to make the most of the credit facilities available to them, it is important to provide training and technical assistance on farm management practices, new technologies, and other relevant topics. This will help farmers adopt best practices and make informed decisions about how to invest their credit funds. Agricultural credit providers should explore innovative credit products that are tailored to the specific needs of different types of farmers, like small-scale farmers or those in specific agricultural sectors. This can help ensure that credit facilities are accessible and relevant to a wider range of farmers. There should be a proper channel that ensures farmers are able to access markets for their products, it is important to provide support for market access

initiatives such as market linkages and value chain development. This may assist farmers in increasing their sales volumes and improve their profitability, enabling them to pay back their credit facilities and invest in their operations. Generally, increasing accessibility to agricultural credit can have a significant positive effect on agricultural productivity in Iowa, USA. By providing farmers with the financial resources they need to invest in their operations and improve their productivity, agricultural credit can contribute to sustainable agricultural growth and development.

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