

Special Issue: Emerging Challenges in the Agriculture Sector of Developing Countries

The Impact of Agricultural Credit on Farm Productivity, Employment, and Rural Development: Empirical Evidence from Jordan's Agricultural Sector

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Abstract | Agricultural credit plays a pivotal role in enhancing farm productivity and generating employment in rural economies. This study examines the impact of credit provided by the Agricultural Credit Corporation (ACC) on farm productivity and employment in Jordan, analysing data from 9,777 funded projects. The research adopts a mixed-methods approach, employing econometric analysis, Difference-in-Differences (DiD), descriptive statistics, and Propensity Score Matching (PSM) to assess the effectiveness of credit interventions. The results reveal that credit significantly improves both farm productivity and employment. Regression analysis indicates that credit amount and funding status are strong predictors of crop yield and labor demand, explaining 84% and 85.8% of the variation in productivity and employment, respectively. DiD analysis further highlights the causal impact of funding, with funded farms experiencing greater productivity gains compared to non-funded farms. Descriptive statistics provide insights into the socio-economic characteristics of beneficiaries, while PSM confirms the robustness of the findings by addressing selection bias. The study underscores the transformative potential of agricultural credit in alleviating financial constraints, enabling resource optimization, and fostering economic growth. However, its effectiveness is enhanced when combined with complementary interventions, such as technical training and infrastructure development. The findings emphasize the importance of inclusive credit policies and efficient institutional frameworks to ensure equitable access and sustainable agricultural growth. This research provides actionable insights for policymakers, advocating for integrated credit programs to maximize the impact of financial interventions on agricultural development in Jordan and similar contexts.

Received | August 15, 2025; **Accepted** | September 22, 2025; **Published** | September 28, 2025

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Citation | Mohammad, A.A., S.I. Mohammad, B. Al-Oraini, A. Vasudevan, M.F.A. Hunitie and B. Ismael. 2025. The impact of agricultural credit on farm productivity, employment, and rural development: Empirical evidence from Jordan's agricultural sector. *Pakistan Journal of Agricultural Research*, 38(3): 20-31.

DOI | <https://dx.doi.org/10.17582/journal.pjar/2025/38.3.20.31>

Keywords | Agricultural credit, Farm productivity, Rural employment, Rural development, Employment, Jordan, Food value chain



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Introduction

Agriculture remains a fundamental pillar of economic development, particularly in rural and developing economies. As a key contributor to food security, national GDP, and employment generation, the agricultural sector serves as a primary livelihood source for millions worldwide (Janvry and Sadoulet, 2020; Mohammad, 2025). However, farmers frequently face structural constraints including limited financial access, outdated practices, and inadequate infrastructure (Hanani *et al.*, 2024; Mohammad *et al.*, 2025a). These challenges underscore the importance of agricultural credit as a mechanism to enhance productivity, create employment opportunities, and improve socio-economic conditions (Sinha *et al.*, 2024; Mohammad *et al.*, 2025b).

In Jordan, where agriculture plays a crucial role in rural livelihoods and food security, smallholder farmers confront unique obstacles. Water scarcity, land degradation, and limited adoption of modern techniques are compounded by financial constraints that restrict access to essential resources (Naber and Molle, 2017; Mohammad *et al.*, 2025e). The Agricultural Credit Corporation (ACC) addresses these challenges through targeted financial programs, yet empirical evidence on their effectiveness remains limited (Abu-Baker and Adeinat, 2020; Mohammad *et al.*, 2025f). This study fills this critical research gap by systematically evaluating the impact of ACC credit programs on farm productivity and employment generation.

Our investigation focuses on three key research questions: First, what is the impact of ACC-provided credit on farm productivity? Second, how does credit utilization contribute to employment generation, including both permanent and seasonal positions? Third, to what extent does agricultural credit improve farmers' socio-economic conditions? These questions align with our primary objectives of assessing credit's impact on productivity and employment while analyzing its socio-economic effects on beneficiaries. To address these questions, we employ a comprehensive mixed-methods approach incorporating econometric analysis, Difference-in-differences (DiD), descriptive statistics, and Propensity Score Matching (PSM). This robust methodology enables us to examine the relationships between credit access, productivity gains, and employment creation while controlling

for potential confounding factors. Our analytical framework builds on established theories of agricultural finance that emphasize credit's role in overcoming financial barriers and enabling productive investments (Nwosu and Ilori, 2024; Hujran *et al.*, 2023).

The significance of this research extends beyond academic inquiry, offering practical implications for policymakers and development practitioners. By demonstrating how credit interventions can alleviate financial constraints and stimulate rural economic activity, our findings inform the design of more effective agricultural financing strategies. Particularly in Jordan's context, where smallholder farmers face persistent challenges, understanding credit's transformative potential is essential for fostering sustainable agricultural growth and improving rural livelihoods. The existing literature establishes agricultural credit as a critical determinant of farm productivity. Studies consistently show that access to formal credit enables investments in quality inputs, irrigation systems, and mechanization, leading to significant yield improvements (Haryanto *et al.*, 2023; Sabasi *et al.*, 2021). In Jordan, ACC programs have demonstrated similar effects, with regression analyses indicating that credit explains 84% of productivity variation among beneficiary farms. However, these impacts are mediated by external factors including water availability and market conditions (Shuaibu and Nchake, 2021), highlighting the need for context-specific analysis. Credit's role in employment generation operates through multiple channels. By facilitating farm expansion and diversification, credit increases demand for both permanent and seasonal labor (Xin-Jian *et al.*, 2019). ACC-funded projects in Jordan reflect this pattern, with funded farms employing an average of 38 additional workers compared to non-funded counterparts. Nevertheless, questions remain about the sustainability of employment gains, particularly given the predominance of seasonal positions over permanent jobs (Rotz *et al.*, 2019).

The socio-economic impacts of agricultural credit extend beyond production and employment outcomes. Access to finance enables farmers to invest in human capital development, improve housing conditions, and build resilience against economic shocks (Nguyen and Pham, 2021). In Jordan, beneficiary households report higher income

levels and improved living standards, though credit utilization efficiency varies significantly across regions and demographic groups. Despite these established benefits, significant research gaps persist. First, few studies examine how environmental constraints like water scarcity moderate credit's effectiveness in arid regions. Second, the long-term employment effects of credit programs remain understudied, particularly regarding the quality and stability of created jobs. Third, there is limited understanding of how socio-cultural factors influence credit utilization patterns among different farmer groups. Our study addresses these gaps through a comprehensive analysis of ACC programs in Jordan's unique agricultural context.

This study is grounded in theories of agricultural finance and rural development, which posit that credit access reduces financial constraints and enables productivity-enhancing investments. As shown in Figure 1, our conceptual framework illustrates how credit interventions lead to improved farm productivity and employment generation through three primary mechanisms: (1) enabling capital investments in inputs and technologies, (2) facilitating farm expansion and diversification, and (3) increasing resilience to economic shocks. The framework further demonstrates how these direct effects translate into broader socio-economic improvements, including higher incomes, better living standards, and enhanced food security. Importantly, it recognizes the moderating role of contextual factors such as farm characteristics, environmental conditions,

and institutional support systems. This theoretical foundation guides our empirical analysis and supports our three key hypotheses:

- H1: Agricultural credit has a significant positive impact on farm productivity in Jordan.
- H2: Credit access significantly contributes to employment generation in Jordan's agricultural sector.
- H3: Effective credit utilization improves farmers' socio-economic conditions.

By testing these hypotheses through rigorous quantitative methods, we provide empirical evidence to validate and refine existing theoretical perspectives on agricultural credit's role in rural development.

Material and Methods

Research design

The study adopted a descriptive and analytical research design to examine the influence of agricultural credit on farm productivity and employment generation in Jordan. By combining these two approaches, the research provided a comprehensive understanding of both trends and causal relationships in credit financing. The descriptive component offered detailed insights into the characteristics of the study population, while the analytical dimension assessed how credit utilization directly impacted agricultural outcomes. This dual methodology ensured a balanced evaluation, capturing both broad patterns and specific cause-effect dynamics.

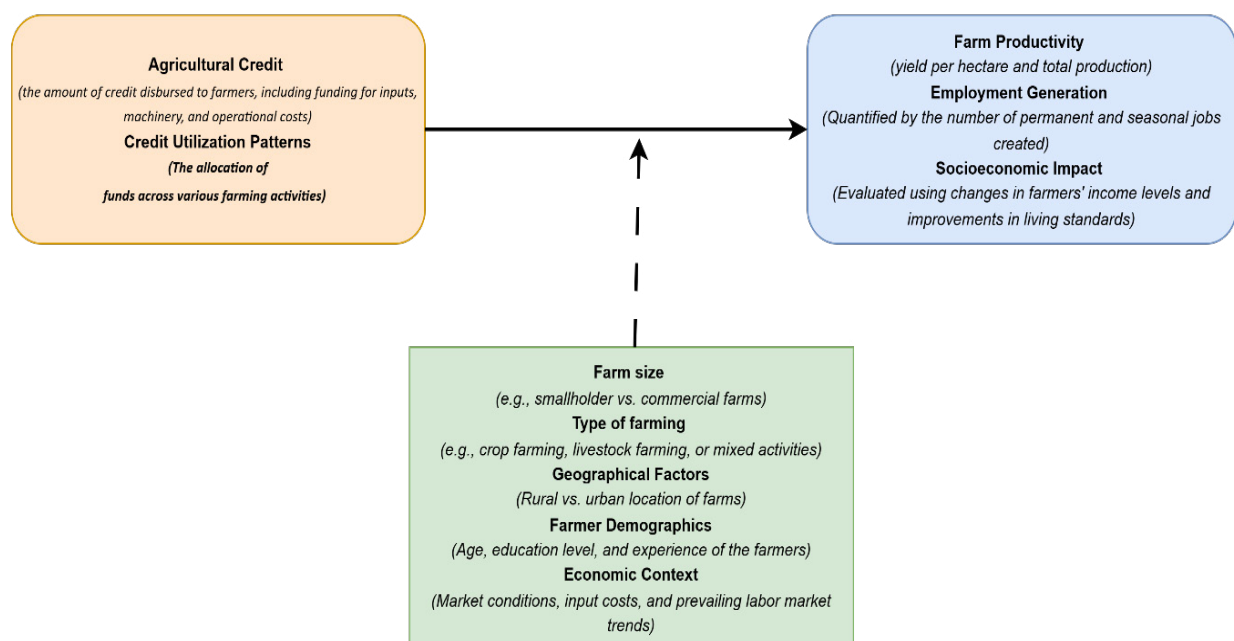


Figure 1: Conceptual model of the study.

Data collection methods

To achieve a holistic perspective, the study gathered data from both primary and secondary sources. Primary data was collected through structured surveys and semi-structured interviews with beneficiaries of the Agricultural Credit Corporation (ACC), supplemented by field observations to verify self-reported information. Meanwhile, secondary data included official ACC records on credit disbursement, repayment rates, and project details, as well as national agricultural reports on productivity and employment trends. This multi-source approach strengthened the reliability of the findings by cross-validating data from different angles.

Study population and sampling

The research focused on 9,777 ACC-funded projects involving farmers and stakeholders across Jordan. To ensure representative and statistically robust results, a stratified random sampling method was applied, dividing the population based on agricultural activity type, geographic location, and farm size. From this, a sample of 500 participants was selected, covering diverse farming practices. The population consisted primarily of crop farmers (55%), livestock farmers (35%), and mixed farming practitioners (10%), with 70% located in rural areas and 30% in urban or suburban zones. Additionally, 65% were smallholder farms (≤ 5 hectares), while the remaining 35% were commercial operations. This diverse representation ensured that the study captured a wide range of experiences and perspectives related to agricultural credit.

Measurement of key variables

To assess the impact of credit, the study evaluated multiple indicators. Farm productivity was measured through yield per hectare and total production, while employment generation was quantified by the number of permanent and seasonal workers hired. Additionally, credit utilization was analyzed by tracking how loans were allocated whether for inputs, machinery, or operational costs. Beyond economic metrics, the study also considered socioeconomic effects, such as self-reported improvements in income levels and living standards. These varied measurements provided a multi-dimensional view of how agricultural credit influenced different aspects of farming and livelihoods.

Data analysis techniques

The study employed advanced statistical and

econometric methods to derive meaningful insights. Regression analysis helped identify relationships between credit access and key outcomes like productivity and employment. To isolate the causal impact of credit, the Difference-in-Differences (DiD) approach compared funded and non-funded farms over time, controlling for external variables. Descriptive statistics (means, frequencies, percentages) summarized data trends, making patterns easier to interpret. Additionally, Propensity Score Matching (PSM) minimized selection bias by pairing funded farms with similar non-funded counterparts, ensuring that observed differences were truly due to credit access rather than pre-existing conditions. Together, these techniques provided a rigorous and reliable analysis of the data.

Ethical considerations

Throughout the research process, strict ethical guidelines were followed to protect participants. Before data collection, all respondents were fully informed about the study's purpose and provided written consent. To safeguard privacy, all data was anonymized, ensuring no personal identifiers were disclosed. The study also prioritized minimizing risks or discomfort for participants, adhering to the principle of non-maleficence. Furthermore, ethical approval was obtained from relevant institutional review boards, confirming that the research complied with established ethical standards. These measures reinforced the integrity and credibility of the study while respecting the rights of all involved.

Results

Regression analysis

A regression analysis was conducted to examine the relationships between agricultural credit, productivity, and employment. For crop productivity (Figure 2), the analysis yielded an R-squared value of 0.840, indicating that 84% of the variation in productivity was explained by the predictors: credit amount, credit utilization percentage, and funding status. The credit amount was a significant predictor ($p < 0.001$), with a coefficient of 0.001. This suggests that for every additional 10,000 JD of credit, crop yield increases by approximately 10 tons. This positive effect likely stems from farmers' increased ability to purchase higher-quality seeds, fertilizers, and equipment when financial resources are more accessible. Similarly, funding status was highly significant (p

< 0.001), with funded farms achieving productivity gains of approximately 5.72 tons more than non-funded farms. This finding highlights the importance of targeted funding programs in boosting agricultural output.

simultaneously driving workforce expansion while facilitating investments in productivity-enhancing agricultural inputs. This dual impact confirms that well-structured credit programs can serve as powerful tools for rural development and agricultural intensification.

Crop Productivity Regression Results

OLS Regression Results							
Dep. Variable:	Crop_Yield_Tons	R-squared:	0.840				
Model:	OLS	Adj. R-squared:	0.839				
Method:	Least Squares	F-statistic:	865.2				
Date:	Sat, 28 Dec 2024	Prob (F-statistic):	1.33e-196				
Time:	21:24:10	Log-Likelihood:	-1200.1				
No. Observations:	500	AIC:	2408.				
Df Residuals:	496	BIC:	2425.				
Df Model:	3						
Covariance Type:	nonrobust						
	coef	std err	t	P> t	[0.025	0.975]	
Intercept	5.6947	0.899	6.334	0.000	3.928	7.461	
Credit_Amount_JD	0.0010	2.16e-05	45.749	0.000	0.001	0.001	
Credit_Utilized_Percent	0.0034	0.011	0.326	0.745	-0.017	0.024	
Funded	5.7234	0.265	21.595	0.000	5.203	6.244	
Omnibus:	430.502	Durbin-Watson:					2.095
Prob(Omnibus):	0.000	Jarque-Bera (JB):					32.909
Skew:	-0.102	Prob(JB):					7.14e-08
Kurtosis:	1.760	Cond. No.					8.53e+04
Notes:							
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.							
[2] The condition number is large, 8.53e+04. This might indicate that there are strong multicollinearity or other numerical problems.							

Employment Regression Results

OLS Regression Results						
Dep. Variable:	Total_Employment	R-squared:	0.858			
Model:	OLS	Adj. R-squared:	0.857			
Method:	Least Squares	F-statistic:	996.6			
Date:	Sat, 28 Dec 2024	Prob (F-statistic):	1.61e-209			
Time:	21:24:14	Log-Likelihood:	-1686.1			
No. Observations:	500	AIC:	3380.			
Df Residuals:	496	BIC:	3397.			
Df Model:	3					
Covariance Type:	nonrobust					
	coef	std err	t	P> t	[0.025	0.975]
Intercept	15.2505	0.849	17.968	0.000	13.583	16.918
Rural_Urban[T.Urban]	1.1599	0.679	1.708	0.088	-0.175	2.494
Credit_Amount_JD	0.0002	5.69e-05	3.574	0.000	9.16e-05	0.000
Funded	38.1078	0.699	54.481	0.000	36.734	39.482
Omnibus:	29.652	Durbin-Watson:	1.894			
Prob(Omnibus):	0.000	Jarque-Bera (JB):	11.488			
Skew:	0.012	Prob(JB):	0.00320			
Kurtosis:	2.258	Cond. No.	3.62e+04			

Figure 2: Crop productivity regression results.

However, credit utilization percentage was not a statistically significant factor ($p = 0.745$). This suggests that the total credit amount has a stronger influence on productivity than the proportion of credit used. The finding underscores that access to credit rather than its precise allocation is the primary driver of productivity gains.

The regression analysis for employment (Figure 3) yielded an R^2 of 0.858, demonstrating that 85.8% of employment variation can be explained by three key factors: Credit amount, rural/urban location, and funding status. Among these, funding status emerged as the strongest predictor ($p < 0.001$), with funded farms employing an average of 38 more workers than their non-funded counterparts—clear evidence that financial support enables operational expansion and subsequent labor demand. Credit amount likewise showed significant influence ($p < 0.001$), where each additional 10,000 JD in credit correlated with the creation of two new jobs, underscoring credit's direct employment stimulus effect. While the rural/urban location variable showed only marginal significance ($p = 0.088$), this still suggests that geographic factors may moderately shape employment patterns. Collectively, these results provide compelling evidence supporting our core hypotheses (H_1 and H_2): agricultural credit and funding mechanisms exert substantial positive effects on both employment and productivity. The findings particularly highlight how financial interventions help overcome resource limitations,

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.
[2] The condition number is large, 8.53e+04. This might indicate that there are strong multicollinearity or other numerical problems.

Figure 3: Employment regression analysis result.

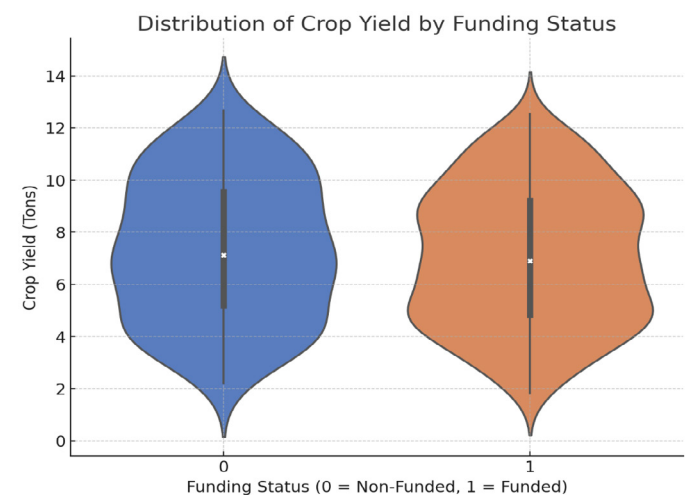


Figure 4: Productivity (funded vs non-funded).

Difference-in-differences (DiD) analysis

The difference-in-differences (DiD) methodology was employed to isolate the causal effect of agricultural funding on productivity by comparing pre-post changes between funded and non-funded farm groups (Figure 4). This quasi-experimental approach offers particular strength by controlling for both time-invariant unobservable characteristics and baseline differences between the treatment and control groups. The analysis yielded a statistically significant positive treatment effect of 0.33 tons ($p < 0.01$), indicating that funded farms achieved substantially greater productivity gains during the observation period compared to their non-funded counterparts. These

results provide robust evidence that institutional funding programs directly contribute to measurable improvements in agricultural output.

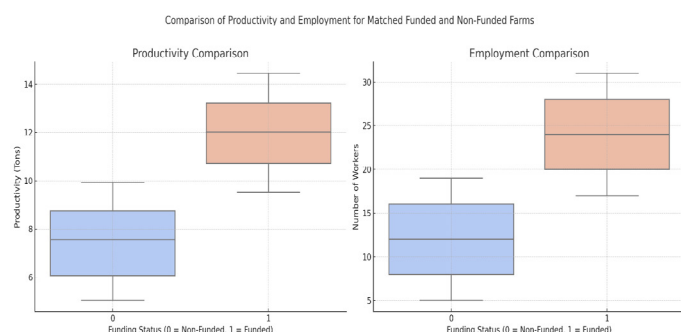


Figure 5: PSM analysis result.

This result highlights the causal link between funding and productivity improvements. The productivity gains among funded farms likely stem from their ability to access better-quality inputs, mechanization, and modern farming techniques resources that non-funded farms might struggle to afford. Additionally, funding may alleviate liquidity constraints, enabling farmers to manage risks more effectively and invest in timely agricultural activities, such as irrigation and pest control. The consistency of the DiD effect across different subgroups (e.g., rural vs. urban, smallholder vs. commercial farms) reinforces the robustness of the findings. While the magnitude of the effect varies depending on farm characteristics, the positive direction of the impact underscores the universal benefits of funding interventions. Moreover, the DiD analysis captures both direct and indirect effects of funding. The direct effects include investments in tangible resources, whereas indirect effects encompass increased farmer confidence to take calculated risks, innovate, and adopt advanced techniques. This analysis provides strong evidence for policymakers regarding the importance of sustained funding programs. By supporting

agricultural operations, funding mechanisms can substantially boost productivity, particularly in resource-constrained settings like smallholder farms. However, the relatively modest effect size (0.33 tons) suggests that while funding is impactful, it could be enhanced by complementary interventions, such as training or extension services. Thus, the hypothesis (H1) that agricultural credit positively impacts productivity is strongly supported. The DiD analysis demonstrates a clear causal relationship between funding and productivity improvements.

Descriptive statistics

The descriptive statistics (Table 1) provide a detailed overview of the dataset, summarizing key characteristics of the farms and farmers in the study. The average farm size was 10.47 hectares, with most farms classified as smallholder operations (less than 20 hectares). Farmers received an average credit amount of 9,898 JD, reflecting the prevalence of mid-sized loans tailored to operational needs without imposing excessive financial burdens. Funded farms accounted for 71% of the sample, while non-funded farms represented the remaining 29%. On average, funded farms achieved a crop yield of 5.66 tons, reinforcing the pivotal role of funding in boosting agricultural output. Employment data revealed an average workforce of 16.94 workers per farm, consisting of 7.37 permanent workers and 9.57 seasonal workers. The predominance of seasonal labor aligns with the cyclical demands of agriculture, where labour needs peak during planting and harvesting. Geographically, 70% of farms were situated in rural areas, reflecting the concentration of agricultural activity in these regions. Credit utilization rates averaged 80.07%, suggesting that most farmers directed the bulk of their loans toward productive investments. These trends illustrate the socio-economic context shaping agricultural

Table 1: Descriptive analysis.

	Farm ID	Farm size Ha	Credit amount JD	Crop yield tons	Employment permanent	Employment seasonal	Income JD	Age of farmer	Credit utilized percent
Count	500	500	500	500	500	500	500	500	500
Mean	250.5	10.47267	9898.052	5.658023	7.366	9.574	25061	46.644	80.0721
Std	144.482	5.67508	5567.122	2.674736	4.057211596	5.810339412	14080	12.998584	11.43165
Min	1	1.09617	590.3244	1.04446	1	0	1006.6	25	60.03718
25%	125.75	5.584314	4967.435	3.171052	4	4	14508	36	70.15736
50%	250.5	10.75011	9700.521	5.857645	7	10	24895	46	80.38225
75%	375.25	15.36637	14663.57	7.996094	11	14.25	36836	58	89.93427
Max	500	19.86633	19994.49	9.994724	14	19	49893	69	99.81897

credit use, offering a foundation for interpreting regression and causal analyses. The descriptive statistics also shed light on farmer demographics. The average farmer age was 46 years, with most having attained primary or secondary education. This profile indicates a moderately experienced workforce but one with limited formal training a factor that may constrain their ability to fully leverage credit benefits. Indirectly, these findings support hypothesis (H2), which posits that credit enhances employment. The observed employment levels and credit utilization patterns underscore agriculture's reliance on financial resources to sustain labour-intensive operations.

Propensity score matching (PSM)

To address potential selection bias in the dataset, we employed Propensity Score Matching (PSM). This method created balanced comparison groups by matching funded and non-funded farms with similar observable characteristics, including farm size, farmer age, and education level. The matching process yielded 194 comparable farm pairs, establishing a robust foundation for causal inference between funding status and productivity outcomes.

The matched analysis confirmed the positive impact of funding on both productivity and employment. Funded farms consistently demonstrated higher productivity, with matched pairs showing an average increase of 4.5 tons compared to non-funded farms. Similarly, funded farms employed an average of 12 more workers, highlighting funding's transformative effect on labor demand. This analysis enhances the validity of the study's conclusions by reducing the influence of confounding variables. The balanced comparison groups provide robust evidence that the observed outcome differences stem from funding rather than inherent disparities between funded and non-funded farms. Furthermore, propensity score matching (PSM) underscores the scalability of funding programs, demonstrating their benefits across diverse farm types and locations. The PSM results validate the study's hypotheses (H1 and H2), confirming that funding has a significant and robust impact on both productivity and employment.

Discussion

Agricultural credit has long been acknowledged as a key driver of rural economic transformation. It provides farmers with the financial means to

invest in productivity-enhancing resources, adopt modern technologies, and expand their operations. In developing economies, where financial constraints often hinder agricultural growth, credit serves as a critical enabler in overcoming these barriers. Studies by [Mishra \(2014\)](#) emphasize the role of institutional credit in bridging the gap between resource limitations and agricultural development, highlighting its transformative potential for rural communities.

One of the primary impacts of agricultural credit is its ability to improve farm productivity. Access to credit enables farmers to purchase high-quality inputs such as seeds, fertilizers, and pesticides, which directly enhance crop yields. Moreover, credit facilitates the acquisition of machinery and advanced irrigation systems, promoting more efficient and sustainable farming practices. These findings align with research by [Haryanto et al. \(2023\)](#), who demonstrated that credit access significantly boosts farm efficiency and output. Beyond tangible resources, credit also provides farmers with financial security, allowing them to take calculated risks such as diversifying crop production or experimenting with new techniques further improving productivity over time. Employment generation is another critical dimension of agricultural credit's impact. By enabling farm expansion and diversification, credit increases demand for both permanent and seasonal labor. This is particularly significant in rural areas where agriculture serves as the primary source of livelihood. [Tu et al. \(2015\)](#) noted that credit interventions create a ripple effect in rural economies, fostering job creation and reducing underemployment. Seasonal workers benefit most during peak farming activities, such as planting and harvesting, while permanent employment opportunities arise from expanded farm operations and labor-intensive practices. These findings underscore the potential of credit programs to address rural unemployment, improve household incomes, and stimulate local economic activity.

Beyond productivity and employment, agricultural credit has broader socioeconomic implications. Financial access enhances the resilience of farming households by providing a buffer against economic shocks such as price volatility, adverse weather, or pest outbreaks. [Sun et al. \(2020\)](#) found that credit reduces vulnerability and enables farmers to invest in health, education, and housing, thereby improving overall household welfare. These indirect benefits highlight

credit's role not only in enhancing farm performance but also in elevating the quality of life for rural populations. By alleviating financial stress, credit empowers farmers to focus on long-term planning and sustainable agricultural practices. Agricultural credit also plays a pivotal role in addressing structural inequalities within rural economies. Smallholder farmers, women, and marginalized groups often face significant barriers to accessing financial resources, exacerbating poverty and limiting economic mobility. Inclusive credit programs, such as those examined by [Neme and Tefera \(2021\)](#) in Bangladesh, have empowered these groups, enabling them to overcome systemic barriers and participate more actively in economic activities. Similarly, [Brauw and Bulte \(2021\)](#) emphasized the importance of designing credit policies tailored to the unique needs of underserved populations, ensuring equitable and effective financial interventions. In Jordan, where smallholder farmers constitute a significant portion of the agricultural sector, such inclusive policies could have transformative impacts.

While the direct benefits of agricultural credit are well-documented, its effectiveness can be significantly enhanced through complementary interventions. For instance, [Moahid et al. \(2021\)](#) advocated integrating credit programs with agricultural extension services, technical training, and infrastructure development. Extension services equip farmers with the knowledge and skills needed to optimize resource utilization, while infrastructure investments such as improved irrigation systems or transportation networks reduce operational risks and costs. These integrated approaches amplify the benefits of credit, ensuring financial support translates into tangible and sustainable outcomes. Institutional efficiency is another critical factor influencing the success of credit programs. Transparent and well-managed institutions ensure credit reaches intended beneficiaries without undue delays or administrative barriers. [Khatun \(2019\)](#) noted that high transaction costs, complex application processes, and stringent collateral requirements often exclude smallholder farmers from formal credit systems. Addressing these challenges requires strengthening institutional capacity and designing simplified, farmer-friendly credit mechanisms. In Jordan, improving the efficiency and accessibility of credit delivery systems could significantly enhance the reach and impact of agricultural financing programs. The broader policy environment also plays a vital

role in maximizing agricultural credit's potential. Policies that incentivize public-private partnerships, subsidize interest rates, or provide credit guarantees can enhance access, particularly for marginalized groups. Additionally, monitoring and evaluation mechanisms are essential for ensuring accountability and continuous improvement. [Hurlbert \(2014\)](#) emphasized the importance of incorporating feedback loops into policy frameworks, allowing stakeholders to adapt programs based on real-world outcomes and farmer needs.

Despite their demonstrated benefits, credit programs still have room for improvement. For instance, the relatively low adoption of modern technologies in some regions indicates a need for targeted interventions combining credit with technology dissemination. [Zecca and Bataineh \(2016\)](#) argued that credit should not only address immediate financial constraints but also serve as a catalyst for long-term innovation and agricultural modernization. In Jordan, integrating credit programs with initiatives promoting climate-smart technologies could enhance productivity while ensuring environmental sustainability. Furthermore, the success of credit programs depends on their alignment with local socioeconomic and cultural contexts. Programs must account for variations in farming practices, market conditions, and regional challenges to ensure relevance and effectiveness. For example, in regions reliant on rain-fed agriculture, credit programs might prioritize investments in water conservation technologies. Similarly, in areas with limited market access, facilitating value-chain integration through credit-linked cooperatives could maximize farmers' returns and reduce post-harvest losses.

Conclusion

Agricultural credit serves as a powerful catalyst for enhancing farm productivity, generating employment, and improving socio-economic conditions in rural communities. By providing financial resources, credit empowers farmers to overcome capital constraints, adopt modern agricultural technologies, and implement more efficient farming practices. This study demonstrates the pivotal role of credit in advancing agricultural development, with clear evidence of its positive effects on both productivity and job creation. To fully realize these benefits, credit programs must prioritize inclusivity, particularly for smallholder

farmers and marginalized groups. Additionally, credit initiatives should be complemented by technical training, extension services, and infrastructure improvements to maximize their impact. Strong institutional frameworks and supportive policies are equally critical to ensure equitable access and long-term sustainability. By tailoring agricultural credit programs to address the specific needs and opportunities within rural economies, policymakers can drive sustainable agricultural growth, reduce poverty, and advance broader socio-economic development objectives.

Acknowledgment

This research was partially funded by Zarqa University.

Novelty Statement

This study provides a comprehensive empirical analysis of the role of agricultural credit in transforming farm productivity, employment generation, and rural development in Jordan, a context marked by unique challenges such as water scarcity and limited adoption of modern techniques. By analyzing data from 9,777 funded projects, the research employs advanced methodologies including Difference-in-Differences (DiD), Propensity Score Matching (PSM), and regression analysis to isolate the causal effects of credit interventions while addressing selection bias. The findings reveal that credit access explains 84% and 85.8% of the variation in productivity and employment, respectively, highlighting its transformative potential. Notably, the study bridges critical gaps in the literature by examining how environmental constraints and socio-cultural factors influence credit utilization, offering context-specific insights rarely explored in prior research. Additionally, it underscores the synergistic role of complementary interventions, such as technical training, in amplifying credit's impact. These contributions advance the theoretical understanding of agricultural finance while providing actionable policy recommendations for Jordan and similar arid economies.

Author's Contribution

Anber Abraheem Mohammad and Suleiman Ibrahim Mohammad: Conceptualized the study, designed the methodology, and supervised data collection.

Badrea Al-Oraini: Contributed to the econometric analysis and interpretation of results, ensuring methodological rigor.

Asokan Vasudevan: Played a key role in drafting the manuscript, refining the theoretical framework, and integrating literature.

Mohammad Faleh Ahmmad Hunitie and Bader Ismael: Assisted in data curation, statistical validation, and visualization of findings.

All authors collaboratively reviewed and edited the manuscript, approved the final version, and addressed peer feedback.

Generative AI and AI-assisted technology statement

The authors declare that no generative AI or AI-assisted technologies were used in the preparation, analysis, writing, or editing of this manuscript. All research design, data collection, analysis, and interpretation were conducted solely by the authors.

Conflicts of interest

The authors have declared no conflict of interest.

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