Impact of Agricultural Credit on Marginal Farmers' Income and Local Economic Development in Northern Bangladesh

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Abstract

This research aims to identify relationships between agricultural finance, Local agricultural growth, and Local economic development based on data collected in northern Bangladesh. The data for our sample is collected from branches of Rajshahi Krishi Unnayan Bank and microcredit based banks operated by non-governmental organizations (NGOs), both of which provide loans to farmers. We use a generalized method of moments (GMM) and a random-effects (RE) model to investigate the association between agricultural loans and economic and agricultural development in various regions. According to our research, agricultural loans significantly boost local economic and agricultural development. The provision of loans to rural firms and farmers has a direct and positive connection with the progress of agriculture and the economy in a certain region. Various types of loans, including as microcredit, loans for rural individuals, SME loans, moneymaking loans, and others, have a positive impact on local agricultural growth. Hence, we may deduce that the increase of agricultural loans provided by banks in the northern region contributes to the progress of both the local and national economies.

Keywords: Agricultural, Credit, Marginal Farmers, Economic Development, Northern Bangladesh, Agricultural Credit.

1.1 Introduction

Agriculture in Bangladesh's economy needs to be improved due to low profitability, significant operational hazards, and unappealing investor prospects, despite its importance to rural economies. Investors withdrew their investments from Bangladesh's agriculture sector for an extended period. Bangladesh has made remarkable economic progress with the agricultural sector providing critical support to its industrial sector. Nevertheless, the government of Bangladesh implemented structural reforms to address the country's agricultural sector's systemic issues, which were initiated with the onset of the modern economic era. At present, Bangladeshi agriculture is undergoing a transition from traditional to contemporary methods, as well as a transition from

large-scale to more focused activities. A novel operational paradigm is emerging as a result of the expansion of agricultural enterprises. The new agriculture management paradigm necessitates enhanced banking services and additional funding to promote rural economic growth. The progress of small enterprises and farmers in rural Bangladesh is impeded by a scarcity of rural capital, a flawed rural financial supply system, and a lack of credit. Agricultural credit has the potential to influence economic expansion, given the necessity of funds. The economy can sustain endogenous growth through the continuous accumulation of capital, as demonstrated by the research conducted by Jones and Manuelli (1990) and Rebelo (1991). The primary objective of rural commercial banks is to facilitate rural lending for farmers and affiliated enterprises. Although it is imperative to support the development of agriculture, rural commercial institutions must also priorities sustainability. In Bangladesh, rural commercial banks are permitted to operate autonomously, without government intervention. Consequently, the quantity of agricultural loans and total bank risk can be reduced by exercising caution when granting loans. The provision of agricultural loans has a substantial effect on the development of agriculture banks and other rural financial institutions, as well as the agricultural sector in Bangladesh. Consequently, this investigation delves into the specifics of agricultural finance in relation to the development and expansion of agriculture in particular regions. Typically, resources are allocated to locations that are more efficient. The distribution of resources by rural commercial banks is the primary focus of this study, which also addresses two fundamental research concerns. Does the expansion of loans to more productive non-agricultural segments contribute to the improvement of the whole economy? Would it be more effective to promote Local economic development and growth by increasing agricultural loans?

As our reading of previous research, no empirical research has been done so far to investigate the relationship between the economic development and Farmers' Income and the various forms of agricultural financing at a Local level in Bangladesh. The evidence accessible in this study supports the establishment of agriculture financial institutions in developing nations and the influence of agricultural loans from microcredit banks on economic growth and development. The results of this research can be used to inform the efforts of lawmakers to improve the economic situation in rural Bangladesh and other underdeveloped nations by utilizing rural financial institutions. This investigation investigated the relationship between economic advancement and agricultural financing and Local agricultural expansion. The endogeneity subjects in the panel dataset were determined by applying the (GMM) and a random-effects model. In summary, the consequences of the study suggest that rural credits have a beneficial effect on the development of both rural agricultural communities (LAG) and rural economic communities (FIG) in the regions where they are offered. One of the most significant factors that affect LAG and FIG is the non-agricultural loan (NAL), which offers advantages to both. This section contains the remaining portion of the paper. In Section 2, we analyze the current body of knowledge regarding the influence of agricultural financing on Local GDP and commercial expansion. The topics of data collection, variable measurement, sample selection, and the utilization of econometric models are addressed in Section 3. Section 4 contains our findings and analysis. The study and its implications for policy are succinctly summarized in Section 5

2. Literature review

There are varying perspectives on the correlation between agricultural loans and the growth of agriculture and broader economic expansion. Certain scholars argue that agricultural financing exerts a significant influence on both economic growth and agricultural development, whilst others hold a contrasting viewpoint. One of the most efficient ways to overcome poverty is through agricultural financing, which provides essential money for agriculture. Agricultural financing is facilitating the transformation of rural communities by providing financial resources to those lacking physical capital, leading to poverty reduction. Sakib, M. N., Hurira, A., & Islam, S. (2022) was an early advocate of the notion that enhancing financial infrastructure may have a substantial impact on savings, investment, and ultimately economic growth. According to American economist W.A. Lewis, small-scale farmers require financial resources in order to expand their businesses beyond their current capacity to save (Sakib, M. N., Hurira, A., & Islam, M. A. 2022). The findings of a 1980 study conducted by Binswanger, which were later confirmed by Burgess and Pande in 2005, demonstrate that formal financial loans have a major constructive outcome on the income and productivity of rural households. (Siddique, F., Hurira, A., & Sakib, M. N. 2022) argue that there is a strong correlation between rural output and agricultural loans. Additionally, it is their belief that agricultural loans provided by developing nations in 1879 contributed to a substantial increase in agricultural output on a large scale. The study conducted by Xiao and Liu (2010) in Hunan Province of China found a substantial correlation between agricultural loan and agricultural economic development. In addition, rural loans from agricultural development banks have been demonstrated to have a positive association with agricultural development (Bai and Li, 2005). Yue (2008) discovered a significantly positive relationship between the provision of rural funding and the growth of the agricultural economy in Henan Province, one province beside Hubei in China. Hurira, A., Rahman, M. A., Rahman, R., Ahamed, M. S., Bhowmik, J., & Ebad, A. N. (2024) selected agricultural output and agricultural loans in China from 1978 to 2006 as a sample, that is to say, there is a cointegration relationship between agricultural credit and the economic growth of agriculture. Agricultural loans greatly boosted the growth of agricultural productivity. Zhang (2012) used the Vector Error Correction model (VECM) to analyze the connection between agricultural finance and agricultural development in China. What was apparent from the data was that it takes even longer for agriculture funding to impact economic growth. Iqbal (1983) contradicts these findings by failing to find an empirical relationship between Agricultural investment and growth in the region.

Yao and He (2004) conducted a co-integration test to examine the long-term equilibrium connection between rural economic development and agricultural finance. However, their findings indicated the absence of such a relationship. According to Pei (2010), there is no long-term connection between rural credit and agricultural growth in China. Many studies overlook definite monetarist organizations and categories of loans in order to focus on the overall impact of financial loans on GDP growth. Rural commercial banks are vital financial associations in pastoral areas and an integral measure of the government-operated agricultural assistance scheme. This study is a significance on identifying the different agricultural loan plans available from these institutions by which it intends to conform the types of programs RTIC By reviewing. It may also be worthwhile to investigate the findings elsewhere of effects on Local agricultural and economic development due to rural credit (Abdulai et al. It will provide wide availability of agricultural credit to farmers and local bodies will stimulate national Farmers' Income in other related economic activities. The newly created agricultural system in Bangladesh increases the rate of rural economic growth and quite substantively, is facilitated by rural banking institutions in Bangladesh. In the present century, agriculture is not as financially rewarding as many other

professions. As a result, many countries prioritise other sectors when developing policies and providing training for future farmers Easmin, N., & Hurira, A. 2023. Due to the emergence of alternative income-generating methods in numerous industrialised and middle-income countries, developing nations are increasingly compelled to depend primarily on agriculture, which is gradually becoming a less significant contributor to their GDP. Nations lacking alternative employment opportunities must rely on agriculture, despite its limited and sluggish earning capacity. Ensuring the global food supply is contingent upon the involvement of specific nations or segments of the population in agriculture (Arcand, 2000). The agriculture industry must discover methods to enhance productivity without compromising the allocated time or human resources (Islam, M. N., Siddique, F., & Hurira, A. 2023). To put it differently, a complete cessation of industrial activities is not the solution. Utilising a workforce with advanced expertise and doing top-notch agricultural research can yield significant results (Ashley and Maxwell, 2001). This would only be possible if timely agricultural education is delivered to different groups and levels, and if education, training, and agricultural policies collaborate effectively.

3. Methodology of the study

Data Collection and Variable Selection

This study is mainly depend on primary data collected directly from original sources. Both structured and unstructured questionnaires were distributed to correspondent banks and household individuals in order to gather data on the number and size of credit distribution each month, as well as customer loan repayment statistics. This data will accurately depict the situation of agriculture credit in those areas. For the purpose of sampling, we categorized the loan sources into two distinct groups: commercial bank credit sources and microcredit sources provided by non-governmental organizations (NGOs). To begin, we randomly select six districts from the northern division of Bangladesh: Rajshahi, Natore, Naogaon, Bogura, Pabna, and Chapainawabganj, then choose three branches of Rajshahi Krishi Unnayan Bank and three well-known NGOs, namely Brac, Grameen Bank, and Asha. All of these institutions offer microcredit specifically for agricultural purposes from each specific districts. Ultimately, we choose 30 households from both NGOs and Krishi Bank branches area in each district. Consequently, this study found that both the NGO and Krishi bank have a total of 36 branches and serve 180 households as a sample component in study areas. Hence, we gather data from banks' annual reports as well as we ask respondent to share primary data from over a past two years including base year. For instance, let's define period 1 as a specific moment in time that is associated with two preceding values, t-1 and t-2.

- Agricultural Credit

Commercial agricultural banks offer a wide range of loan types to support farmers in their activities. Analyzing agricultural loans enables one to assess agricultural credit. Initially, we categorized agricultural loans into three distinct groups: loans designated for rural companies, loans for farmers, and loans for rural economic organizations. In the subsequent stage, the loans offered to farmers were classified into many categories, such

as microcredit, joint guarantee loans, commercial farming loans, and household loans. The current study utilized these features as explanatory variables.

- **Local Farmers' Income and Economic Development**

Local Farmers' Income (LFI) is an aspect of economic growth that assesses the agricultural enactment of a regions. Local economic development, on the other hand, refers to the procedure by which a regions acquires the capability to recover its dogmatic, social, and economic circumstances. To evaluate the amount of agricultural output produced by farmers in each hectare, we will utilise the Farmers' Income rate as an indicator of Local Farmers' Income (LFI). The dependent variables in this study were Northern part Economic development (NED) and Local Farmers' Income (LFI). Moreover, the indicator for assessing Local economic progress in the northern FIGion will be the socio-economic status, which includes the income range of farmers and their satisfaction with agricultural credit that aids them in the agricultural sector. Additionally, it will also consider the percentage of farmers who have obtained agricultural credit with the goal of enhancing their agricultural production.

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- **Other Variables**

We conducted a study to examine additional factors that contribute to local agricultural development and financial development. We included non-agricultural credits, loan growth rate, and non-performing loans as control variables in our analysis. This is consistent with previous research conducted by Laeven and Levine (2009), Lepetit et al. (2008), and Demirgue-Kunt and Huizinga (2010).

Econometric Model

With Regards to the recommendation by W.M. Jeffrey (2001), Hartarska, Nadolnyak, and Shen (2015) conducted the study to conclude the nature of the connection between agricultural credit, Farmers Income, and economic development. The authors used a system GMM and random effects model .We formulated a model and derived the subsequent equations to illustrate the relationship between agricultural loans and the farmers output in different Regions.

$$LFI_i = \beta_0 + \beta_1 AC_i + \beta_2 \sum controlV\ v_i + \beta_0 + \varepsilon_i \quad (1)$$

$$LFI_i = \beta_0 + \beta_1 LNG_i + \beta_2 SMFL_i + \beta_3 \sum controlV_i + \beta_0 + \varepsilon_i \quad (2)$$

$$LFI_i = \beta_0 + \beta_1 MCL_i + \beta_2 HGC_i + \beta_3 SL_i + \beta_4 FMC_i + \beta_5 LNG_i + \beta_6 SMFL_i + \beta_7 \sum controlbV_i + \varepsilon_i \quad (3)$$

The model represent relationship between agricultural credit and frames income and Local economic development, the equations for RE and GMM models are:

$$NEG_i = \beta_0 + \beta_1 AC_i + \beta_2 \sum controlbank_i + \beta_0 + \varepsilon_i \quad (4)$$

$$NEG_i = \beta_0 + \beta_1 FL_i + \beta_2 LNG_i + \beta_3 SMFL_i + \beta_4 \sum controlV_i + \beta_0 + \varepsilon_i \quad (5)$$

$$NEG_i = \beta_0 + \beta_1 MCL_i + \beta_2 HGC_i + \beta_3 SL_i + \beta_4 FMC_i + \beta_5 LNG_i + \beta_6 SMFL_i + \beta_7 \sum controlbV_i + \varepsilon_i \quad (6)$$

In equations (1) to (6), NEG it is Northern Economic economic growth rate. LFIit is Local Farmers' Income rate, ALit is the agricultural loans, FLit is the loans to farmers, LNGit is the loans to rural economic organizations, SMFLit is the loans to rural enterprises, MCLit is the microcredit loans for farmers, HGCit is the joint guarantee loans to farmers, SLit is startup farmers' loans, FMCit is other types of loans to farmers, Control bank it represents the control variables related to bank loan characteristics. β1, β2, β3, and β4 are coefficients of variables. εit is the error term.

4. Results and Discussion

label	Variable s	Variables Measurement
LFI	Local Farmers' Income	Farmers' Income rate to lag periods (%)
NEG	Northern area economic Growth rate	Northern area growth rate to lag period (%)
AC	Agricultural Credit	agricultural credits Ration to total credits Percentage
LNG	Local NGO loans	Ratio NGO loans to total loans (%)
SMEL	SME loan	Ratio of SME loans to all lone(%)
MCL	microcredit loan	Microcredit loans ratio to total loans (%)
HGC	Household guarantee Credits	Farmers guarantee loans ration to total loans (%)
SL	Startup loan	farmers' startup loans ratio to total loans (%)
FML	Farmer's Miscellaneous loans	Miscellaneous loans Ratio to farmers to total loans (%)
NFL	Non farming loan	non-agricultural loans Ratio to total loans (%)
LGR	Loan growth Rate	Loan amount equated to the growth rate (%)
NC	Non-performing Credit	non-performing Credits ratio total loans (%)

Table 1. Variables Details.

Variable	Mean	Std. Dev.
LFI	0.0623	0.0393
NEG	0.1238	0.0734
AC	0.6567	0.3004
LNG	0.0055	0.0076
SMEL	0.3780	0.2421
MCL	0.0067	0.0142
HGC	0.0066	0.0244
SL	0.0000	0.0000
FMC	0.1845	0.1718
NFL	0.2196	0.2925
LGR	0.1730	0.0716
NC	0.0241	0.0442

Table 2. Summary of descriptive statistics

Each variable in this investigation was subjected to descriptive statistics, as illustrated in Table 2. The LFI has a mean of 0.613 and a standard deviation of 0.0393. The ave LFIe is 0.1238, and the standard deviation is 0.0734 for FIG. The Region's agricultural and economic development exhibit some degree of parallelism. LFI and NEG are currently at their lowest values of -0.0497 and -2.516, respectively. The values for LFI and NEG have attained their highest point at 0.1489 and 0.7996, respectively. Despite the fact that Local disparities in Farmers' Income rates are negligible, the stark contrast between the highest and lowest rates suggests an imbalance in the FIG. Agricultural development is disseminated more equitably throughout Region's in comparison to Local development. The standard deviation of NEG is 0.3004, which indicates a greater degree of unpredictability. In contrast, the average loan for agriculture (AC) is 0.6567. Agricultural loans (AC) are loans that are exclusively intended for farmers, rural enterprises, and other rural economic groupings. The mean loan amount granted to rural firms has a standard deviation of 0.2057.

The Mean of LNG is 0.0055 and the standard deviation is 0.0076. SMFLs provided to rural companies revealed an average of 0.3780 and variance of 0.2421. As for the sorts of loans: the rural people may get microcredit loans, Joint loans, NGO loans others loans. The microcredit lending to farmers (MCL) parameter in the current study has a mean of 0.0067 and a standard error of 0.0142. The average of joint guarantee loans to farmers

(HGC) is 0.0066 with standard deviation of 0.1562. The mean for other types of loans is 0.1845 with standard deviation equal to 0.1718. What the figure 1 illustrates the picture of progress of agriculture and economic sector in In those study areas from 2012 to 2016 With the movement of agricultural loan. The trend analysis of the proportion of agricultural credit in the total lending portfolio of rural commercial banks also indicates a time decay. The two objectives which are clearly contradictory are the continual growth of rural commercial banks and the declining agricultural loan ratio. Conventionally, Local Farmers' Income (LFI) has surpassed Local economic growth (NEG) and today it is not the major contributor to it. The agricultural loan-to-deposit ratio at rural commercial banks has experienced a general decline, with the most significant change observed in the latter. In 2013, the Local Farmers' Income rate had a noticeable decline. However, the overall trajectory of development remains positive, primarily due to agricultural crises. The prevalence of illness increased, leading to a decrease in tolerance to cold temperatures, ultimately resulting in a reduction in yield. While the self-regulating mechanism of the market mitigated fluctuations in agriculture and decreased the impact of agriculture on the Local economy, it is noteworthy that the Local economy was minimally affected. Although agriculture had a minimal impact on FIG, as depicted in the figure, the delayed consequences of decreasing agricultural production have recently led to a decline in NEG.

	Model-1		Model-2		Model-3	
Names Of Variables	Random Effect	GMM	Random Effect	GMM	Random Effect	GMM
LLFI		-0.49*		-0.52		-56
AC	0.12	0.086*				
LNG			0.52	-0.04	0.5***	0.029
SMEL			0.087	0.077	0.05*	0.098***
MCL					0.38***	0.68**
HGC					0.005	-0.07
SL					1087.25*	833.36*
FMC					0.12*	0.12**
NFL	0.17*	0.14*	0.14	0.1	-0.011	0.12**
LGR	0.06	0.07	0.0008	0.03	0.052	-0.0088
NPC	0.08	0.15	0.09	0.006	-0.0408	0.06
Constant	-0.076**	16.35*	-0.0051	19.3	-0.4098	15.355
R-Squares	0.28		0.67		0.504	
Hausman Test	0.69		0.07		0.1	
F-test		42.8*		28.8		16.26

No-of instructions		20		23		26
AR-1		-2.69**		-2.52		-2.19
AR-2		-3.45		-3.97		-3.61
Sargen Test		144.17*		127.17 *		116.29*

Table 3. Agricultural loans and Local agricultural growth.

Level of Significance *p < 0.01, **p < 0.05, ***p < 0.1

Note Table 1 for variables descriptions.

(Cont...)

The results of the link between LAG and the different types of agricultural loans offered by rural banks are shown in Table 3. The effect of aggregate agricultural loans on LFI is depicted in Model 1. Model 2 shows how three different forms of agricultural finance affect LFI. Model 3 looks at how different types of agricultural loans affect the LFI (risk-adjusted growth) indicator. At the 1% and 5% significance levels, respectively, the results of Model 1, which were examined using the generalized linear modelling (GMM) and random-effects (RE) model, show that the overall amount of agricultural loans had a significant and positive impact on LFI. A 1% rise in agricultural loans is clearly correlated with a 0.0994 percentage point (GMM) or 0.1245 percentage point (RE) increase in LFI, according to an analysis of the agricultural loan coefficients obtained from a GMM model (0.1243) and a RE model (0.0994). These results suggest that the expansion of agriculture was made possible in large part by loans from rural commercial banks. It is feasible to provide farmers and rural communities with various forms of financial help in order to hasten agricultural expansion (Table 3). The non-agricultural loan (NAL), one of the regulatory components, has a positive and statistically significant impact on local Farmers' Income (LFI) at the 1% level, according to both the RE and GMM models. A 1% increase in non-agricultural loans causes an equal increase in Farmers' Income of 0.135 and 0.1281 percentage points, based on the coefficients predicted by RE and GMM. Even if the loans might not be specifically intended for agriculture, they significantly contribute to the development of local agricultural development (LFI). Various industries are linked in a market economy. One positive effect of the expansion of resources for the secondary and tertiary sectors is a certain degree of demand increase for primary industries. Table 3 illustrates how significant industry-to-industry linkages power the economy as a whole in a market economy. The results of Model 2, which looks into how various types of agricultural loans affect LFI, are shown in Table 3. For example, both RE and GMM calculations demonstrate that the coefficient of farmers' loans has a noteworthy and advantageous influence on encouraging LFI. These results are noteworthy from an economic standpoint since they demonstrate that a 1% increase in farmer loans causes an increase in LFI of 0.1293 and 0.1397 percentage points, respectively (GMM). To encourage the spread of agriculture in those study regions, farmers are given agricultural loans. A lot of rural commercial banks place a high priority on agriculture. As long as the percentage

of agricultural loans is constant, rural commercial banks can increase the total amount of agricultural loans by providing credit to agricultural households with lower levels of risk. As a result, a greater number of farmers will have the opportunity to obtain loans, but at a reduced cost of financing. Consequently, there will be a greater need for funds and technology to facilitate an expansion in production scale. Consequently, the act of boosting production can result in elevated farmer income and general expansion of the agricultural sector. Rural business loans (REL) have a significant and beneficial impact on LAG, as per RE's assessment, which is statistically significant at the 1% level. Each 1% rise in the growth of business loans results in a 0.0996 percentage point increase in the coefficient of REL, which in turn leads to an increase in LAG. This demonstrates how the growth of rural businesses in in those study areas is facilitated by loans provided by rural commercial banks. One of the control variables, non-agricultural loans (NAL), considerably raises LFI. The results of Model 3, which accounts for non-performing loans (NPL), loan growth (LG), and non-agricultural loans (NAL), are displayed in Table 3. The loans include farmer microcredit loans (MCL), farmer joint guarantee loans (HGC), farmer student loans (SL), given a high and positive LNG coefficient, the RE model predicts that a 1% increase in LNG will result in a precise 0.5478 percentage point increase in LFI. This demonstrates the symbiotic relationship between agricultural expansion and the effectiveness of rural organizations, which is facilitated by the provision of loans by rural commercial banks. With the increasing expansion of small-scale farmers in R, the agricultural sector of the country is undergoing a time of significant disruption. Therefore, rural economic groupings comprise farmers who possess greater resources and exhibit higher levels of productivity. Both the RE and GMM estimations yield a substantial and positive coefficient for REL. For each 1% increase in SMFL, The increment in LFI is 0.0776 (GMM) and 0.0959 (RE) percentage points. Microcredit loans to farmers (MCL) had a significant beneficial effect on LAG at the 10% and 5% levels, respectively, based on estimates from RE and GMM. Consequently, LFI increases by 0.3890 and 0.6326 percentage points, respectively, for every 1% increase in the growth of microcredit loans. Furthermore, estimations conducted using the methods of Random Effects (RE) and Generalized Method of Moments (GMM) positive coefficients that are both statistically significant. Consequently, the growth of agriculture in area (LFI) will see a significant increase of 1,087.74 percentage points. Additionally, borrowing from the Financial Services Loan (FSL) will further boost LFI by 883.056 percentage points for every 1% increase in the growth. We found a substantial beneficial influence on LFI at both the 1% and 5% significance levels, based on the study conducted using RE and GMM. A 1% increase in causes an increase in LFI of 0.1269 percentage points and in RIT of 0.1146 percentage points. Furthermore, the alternative variations of FOL exhibit positive and statistically significant coefficients. This implies that a 1% increase in these loans leads to a respective increase of 0.1228 and 0.1238 percentage points in LAG, as observed in the GMM and RE models. Table 3 demonstrates that the NAL coefficient, among the FIGulatory factors, is a significant and positive factor, as determined by both the RE and GMM estimations.

4.3. The Connection between Local Economic Development and Agricultural Credit

Table 4 presents the findings of the association between agricultural loans and local economic growth. The fourth model indicates that, at the 1% and 10% significance levels, agricultural loans (ACs) significantly improve local economic development , based on estimates from RE and GMM. A 1% increase in AC is correlated with a 0.207% point gain in GMM and a 0.1576% point increase in NEG. The provision of loans to farmers by rural commercial banks has contributed to the success of FIG. The availability of farm credit directly correlates with the development of agriculture, as evidenced by the relationship between FIG and agricultural growth. The second stage in developing FIG involves the establishment of a market economy, with the first focus on expanding the major industry. This link benefits the agriculture industry and other sectors of the economy as a whole. NAL and NEG exhibit a positive connection among the controllable factors, with significance levels of 1% for RE and 5% for GMM. Furthermore, this platform supports NEG by making loans available for sectors other than agricultural. Model 5 in Table 4 indicates that FL positively affects NEG, in line with the anticipated 1% significance level of RE. A 1% increase in FL causes a 0.1825 percentage point increase in NEG stimulation. These results show that loans from rural commercial banks foster the growth of farmers' enterprises and raise the level of high-value products output. Moreover, the SMFL coefficients that are obtained from the computation of RE and GMM exhibit statistical significance and positivity. According to this analysis, there is a corresponding increase of 0.1527% in NEG and 0.403% in GMM (Gross Marginal Markup) for every 1% increase in the growth of rural enterprise loans. This implies that loans given to rural enterprises are the main source of the rise in agricultural output and GDP growth. Our view is reinforced by the fact that allocating funds to rural enterprises enhances their agricultural activities. There are many rural enterprises that exist at lower levels of the industrial hierarchy. The loan application assists farmers who desire to grow their operations and increase their production to benefit from it. Concurrently, it enhances the worth of the overall production in the rural economic expansion of the complete industrial chain, hence stimulating the demand for agricultural products generated by upstream farms. NAL positively affects NEG at the 1% and 10% significance levels, respectively, according to the RE and GMM approaches. Table 4, Model 6, shows how different loan kinds affect economic development (NEG). Microcredit loans for farmers (MCL), joint guarantee loans to farmers (HGC), and other forms of loans to farmers (FMC). The findings, when analysed using the RE and GMM approaches, demonstrate unequivocally that SMFL significantly affects REG, with statistical significance observed at both the 5% and 10% levels. RE increases by 0.1426 percentage points and GMM increases by 0.2110 percentage points for every 1% increase in SMFL. Farmers' student loans are represented by the estimated coefficient of FSL, which is both positive and statistically significant, according to the GMM analysis. If the education loans for farmers were to increase by $1, the NEG would experience a significant surge of 458.65 percentage points. The coefficient for RICL is positive and statistically significant. This means that a 1% increase leads to a 0.1506% increase in RE and a 0.1077% increase in GMM. It demonstrates that farmers who get initial loans from rural commercial banks have an increase in their FIG (Rural Entrepreneurship

Growth). In addition, the data indicates that FMC has a positive impact on NEG, as evaluated by both RE and GMM, with statistical significance at the 1% level. Each 1% increase in FMC results in a corresponding 0.1774% increase in NEG for RE and a 0.2333% increase in NEG for GMM. RE provides the estimated positive coefficient of NFC, which is one of the Regulatory factors.

Table 4. Agricultural credit and Local economic development (Growth).

2	Model-4		Model-5		Model-6	
Names of Variables	Random Effect	GMM	Random Effect	GMM	Random Effect	GMM
LFI		.25*		0.24		.2451*
Ag	0.16	.217***				
LNG			-0.43	-0.08244	-0.48	-0.85
SMEL			.1527**	.403**	.1425**	.2550***
MCL					-0.0806	0.1721
HGC					0.348	0.065
SL					235.56	458.65*
FMC					.1774*	.25*
NFL	.16*	.50**	0.17	0.205***	.1599**	0.0117
LGR	0.114	0.11	0.08	0.08	0.0845	0.0953
NC	-0.05	-0.064	-0.06	-0.08	-0.0789	-0.0783
Constant	-0.0348	10.566**	-0.03	11.368**	-0.0258	8.64***
R-Squares test	0.24		0.266		0.3516	
T Hausman Test	0.33		0.7392		0.8696	
F-test		21.04*		16.51*		14.51*
No of instructions				18		25
AR-1		0.78		0.75		0.78
AR-2		-1.25		-2		-0.1
Sargen Test		104.98		106.25*		104.85*

Level of Significance *p < 0.01, **p < 0.05, ***p < 0.1

Note: Table 1 for variables descriptions.

5. Conclusion and Policy Implications

The agricultural sector in Bangladesh significantly benefits from the diverse range of lending options provided by rural commercial banks. Certain loans provide assistance to individual farmers, but others are better suited for rural businesses and organizations. Banks offer farmers both long-term and short-term loans, enabling them to initiate entrepreneurial ventures and enhance their quality of life. They offer loans to farmers to facilitate activities such as launching businesses, obtaining insurance, and financing their children's education. The aim of this study was to investigate the correlation between different forms of agricultural loans and their impact on the growth of the agricultural sector and overall economic development in those area. In order to conduct a more comprehensive analysis, we have categorized agricultural credit into three distinct types: loans provided to individual farmers, loans provided to rural economic groups, and loans provided to rural companies. In addition, we categorized the farmer loans into various forms, such as microcredit, joint guarantee, student, group insurance, and loans for rural entrepreneurs. The variables were analyzed using a generalized mixed model (GMM) and a random-effects model. Our research indicates that there is a strong positive correlation between agricultural credit and LAG. Agricultural loans tend to have a substantial beneficial impact on LAG. LAG experiences considerable benefits when linked with farmer loans, as well as with every other sort of loan. The NAL is another regulatory component that significantly improves LAG. Studies on agricultural finance and its impact on Local economies have demonstrated that these loans significantly boost Local economic growth (FIG). The cumulative impact of all loans, even those obtained by farmers, is highly advantageous for FIG. The NAL is an additional regulatory feature that significantly strengthens FIG. Based on these findings, it can be inferred that rural commercial banks in in those study areas, China, have a significant impact on enhancing Farmers' Income and promoting economic development in the province.

5.1. Policy Implications

The rural commercial banks in this province, who were quick to embrace changes, established a benchmark for the entire nation. Consequently, by augmenting agricultural credit, Bangladesh economy will thrive. Thus, the objective of agricultural finance extends beyond in fostering development. Rural commercial banks continue to provide loans, albeit a smaller proportion of these loans is allocated to farms and ranches compared to previous years. Agricultural loans serve to mitigate the inequality between Bangladesh urban and rural areas and facilitate the advancement of agriculture. The existing level of government support for agriculture is insufficient to facilitate further economic growth. In order to expedite the development of Bangladesh rural economy, it is imperative for the government to provide increased assistance to farmers. Creating a loan support fund specifically designed for farmers and affiliated groups will enable them to easily meet the eligibility requirements.

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