SEARCHING THE FACTORS ON WHICH AGRICULTURAL CREDIT DEPENDS USING PANEL DATA ANALYSIS

Dr. Chandan Bandyopadhyay[1*]

1* Associate Professor, Department of Economics, Kazi Nazrul Islam Mahavidyalaya, Churulia, West Burdwan, West Bengal, Email: chban_econ70@yahoo.com, Mobile No. 9434134393

Abstract

Agriculture sector happens to be an important sector in terms of employing rural Indian people. But its share on GDP is not so significant compared to other sectors. Nowadays, inputs used in this sector become too expensive for the poor farmers, especially fertilizers, water etc. Agricultural credit plays an important role in closing the gap between demand and supply of credit to the farmers in the agricultural sector. Banks provide at least 40% credit to the priority sector out of which 18% should be to the agricultural sector. Disparities in terms of agricultural credit between different regions prevail in India. In this paper an investigation has done for finding the factors on which agriculture credit depends using panel data analysis and it is found that agricultural credit depends positively on agricultural output, positively on gross irrigated area and negatively on gross sown area.

Nationalization of Banks was a very effective step in boosting the banking activities like deposit creation and credit mobilization and thereby modification of banking policy. Any developing economy like India is always thriving for more investment opportunity that will open up more employment avenues to the people of that particular country. Agriculture remains to be the most employment generating sector in India even after Globalization. But its contribution to the GDP is lesser than other sectors. It also happens to be one of the sectors listed under the priority badge.

One of the major policies in the banking sector is to provide credit to the priority sector with the aim of increasing GDP as well as creating more employment opportunities and thereby reducing regional disparity. There are regional disparities so far as economic development is concerned. It is true that all the regions in our country are not equally developed. So it is the national agenda to be a part of the development strategy of those regions that lagged behind. For this reason agricultural credit should be disbursed evenly or may be skewed in favour of the lagged behind regions.

In a Report of the Working Group, RBI, it has been discussed that agriculture credit should be treated as 'credit for agriculture' rather than 'credit in agriculture'. According to this report farmers require credit for investment in agriculture in purchasing inputs which become expensive in this globalized world. Agriculture credit also helps them in continuing their consumption behavior. So banks should provide credit to the farmers in easier terms not only for the production purpose but also for the consumption purpose so that they can engage themselves freely in agricultural activities and increase the production by enhancing their productivities.

In a report of RBI Abhiman Das, Manjusha Senapati, Joice John (2009) had shown the impact of agricultural credit on agricultural production using dynamic panel regression approach. They used district level data from 4 major states in India during the period 2001 to 2006. In their model agricultural output was taken as endogenous variable while taking agricultural credit as exogenous variable among others such as number of credit accounts, rainfall etc. Their primary focus was to find out the causation between agricultural credit and output. They showed that agricultural credit has a positive and significant impact on agricultural output. They had taken agricultural credit as given but in this paper agricultural credit will be treated as endogenous variable. They used dynamic panel regression approach but in this paper simple regression with panel data is used.

M.A.Y. Rahji, S.B.Fakayode (2009) had used Multinomial Logit Analysis to find the factors for rationing of Agricultural Credit by Commercial Banks in Nigeria. They found that the bank's decision to provide credit depends on the age, gender, education, previous year's income, farm size, cooperative members etc. of the loan applicants.

Data and Methodology

We use the secondary data on agricultural credit, agricultural output, gross sown area and gross irrigated area given by scheduled commercial banks to the six different regions during the year 1990 to 2013. The data source is handbook of statistics published by RBI in 2016.

To establish this statistically we run a simple regression model with agricultural credit as explained variable and agricultural output per capita as explanatory variable. We also take Gross Sown Area and Gross Irrigated Area as explanatory variable. Thus we have 6 regions, each region has 24 (from 1990 to 2013) years' data of 3 independent variables with 1 dependent variable. We use OLS technique (using EViews) to the pooled data to test whether there is any kind of relationship between these variables so that we can justify the variability of agricultural credit between different regions. The following table shows the regression result. We standardize the data on

agricultural output and agricultural credit by dividing them by square kilometer area of the particular region. It is assumed that all the factors will have positive impact on agricultural credit.

Table: 1 – Result of OLS using Panel Data

Dependent Variable: AAGCR
Method: Panel Least Squares

Sample: 1990 2013
Periods included: 24
Cross-sections included: 6
Total panel (balanced) observations: 144

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AAGOT	0.261364	0.245287	1.065544	0.2885
_GRIR	3.122614	2.315199	1.348745	0.1796
_GRSW	-0.292292	0.745997	-0.391814	0.6958

R-squared	0.146365	Mean dependent var	54545.48
Adjusted R-squared	0.134256	S.D. dependent var	80648.79
S.E. of regression	75039.95	Akaike info criterion	25.31004
Sum squared resid	7.94E+11	Schwarz criterion	25.37191
Log likelihood	-1819.323	Hannan-Quinn criter.	25.33518
Durbin-Watson stat	0.054652		

Where AAGCR is Agricultural credit per square kilometer area, AAGOT is Agricultural output per square kilometer area, _GRIR is gross irrigated area and _GRSW is gross shown area.

We have seen that the p values are not strongly suggesting the relationship between explained and explanatory variables. We should use the Fixed effects and Random effects model and enquire which model suits better by using appropriate tests.

The result of the fixed effects model is shown in the following table.

Dependent Variable: AAGCR
Method: Panel Least Squares

Sample: 1990 2013
Periods included: 24
Cross-sections included: 6
Total panel (balanced) observations: 144

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-182286.7	78490.04	-2.322418	0.0217
AAGOT	3.218900	0.482673	6.668902	0.0000
_GRIR	15.84021	3.276420	4.834608	0.0000
_GRSW	-7.221255	3.189441	-2.264113	0.0252
	Effects Specification			
Cross-section fixed (dummy variables)				
R-squared	0.642273	Mean dependent var		54545.48
Adjusted R-squared	0.621075	S.D. dependent var		80648.79
S.E. of regression	49644.91	Akaike info criterion		24.52364
Sum squared resid	3.33E+11	Schwarz criterion		24.70925
Log likelihood	-1756.702	Hannan-Quinn criter.		24.59906
F-statistic	30.29788	Durbin-Watson stat		0.460932
Prob(F-statistic)	0.000000			

Table:2 – Result of Fixed Effect Model in Panel DataIn this model we have seen that agricultural output and gross irrigated area are positively and gross sown area is negatively related with agricultural credit. The p values also confirm the level of significance.

Now we have to test the significance of this fixed effect mode. The results are shown in the following table.

Table: 3 – Test for Fixed Effect Model

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	37.027882	(5,135)	0.0000

The p value confirms that the fixed effect model is superior to the pooled regression model. Let us now use the random effect model and the results are

Table: 4 – Result of Random Effect Model

Dependent Variable: AAGCR
Method: Panel EGLS (Cross-section random effects)

Sample: 1990 2013
Periods included: 24

Cross-sections included: 6
Total panel (balanced) observations: 144
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-29832.54	39641.65	-0.752556	0.4530
AAGOT	1.797774	0.388011	4.633306	0.0000
_GRIR	13.22680	3.138850	4.213899	0.0000
_GRSW	-7.381509	1.749907	-4.218230	0.0000
	Effects Specification			
			S.D.	Rho
Cross-section random			38726.61	0.3783
Idiosyncratic random			49644.91	0.6217
	Weighted Statistics			
R-squared	0.376706	Mean dependent var		13808.19
Adjusted R-squared	0.363349	S.D. dependent var		75006.72
S.E. of regression	59848.16	Sum squared resid		5.01E+11
F-statistic	28.20433	Durbin-Watson stat		0.137804
Prob(F-statistic)	0.000000			
	Unweighted Statistics			
R-squared	-1.129411	Mean dependent var		54545.48
Sum squared resid	1.98E+12	Durbin-Watson stat		0.034890

Now test this random effect mode using Haussmann test. The null hypothesis under the Haussmann Test is that fixed effect model and random effect model do not differ substantially.

Table: 5 – Test for Random Effect Model

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	d.f.	Prob.
Cross-section random	66.460549	3	0.0000

The low value of p strongly rejects the Random Effect Model and accepts that Fixed Effect Model is preferred to Random Effect Model. Since the Random Effect Model does not seem to be appropriate we simply go back to the Fixed Effect Model.

We have seen that agricultural output and gross irrigated area positively and gross sown area negatively affects agricultural credit in different regions. The negative impact of gross sown area may be due to the fact that in case of calculating gross sown area the availability of the area of land is counted as many times as there are sowings in a year.

Conclusion

Agricultural sector happens to be one of the main sectors contributing to the economy in terms of production and employment opportunity. Agricultural credit plays an important role in this context. Banks have the target to provide credit to the priority sector. Agricultural sector being one of the priority sectors is in the targeted list of the scheduled commercial banks. The panel data analysis is used to find out the relationship between agricultural credit and agricultural output among others such as gross irrigated area and gross sown area. We have seen that agricultural output and gross irrigated area have positive significant impact on agricultural credit while gross sown area has negative significant impact on it. So we can say that the scheduled commercial banks have to provide credit to the agricultural sector on the basis of the needs of a particular region so that a big push can be given to this sector and thereby to the economy of that particular region as a whole.

References:

1. Abhiman Das, Manjusha Senapati, Joice John**;** Impact of Agricultural Credit on Agriculture Production: An Empirical Analysis in India; Reserve Bank of India Occasional Papers, Vol. 30, No.2, Monsoon 2009
2. Reserve Bank of India, 'Annual Report' various issues
3. Gujrati, N Damodar (2003): Basic Econometrics, 4th Edition
4. RBI (2016-17): Hand Book of Statistics of Indian States
5. M.A.Y. Rahji, S.B.Fakayode (2009): A Multinomial Logit Analysis of Agricultural Credit Rationing by Commercial Banks in Nigeria, International Research Journal of Finance and Economics, Issue 24 (90-100)

Appendix – 1 : Descriptive Statistics

	_AGCR	_AGOT	_GRIR	_GRSW
Mean	263.4878	34429.05	13245.92	31630.23
Median	76.85000	33980.30	12455.50	33956.09
Maximum	2779.000	76265.50	32617.00	56739.80
Minimum	3.440000	4894.600	496.0000	5254.000
Std. Dev.	427.7568	19620.59	8343.528	14062.11
Skewness	3.035419	0.092521	0.187446	-0.536158
Kourtosis	14.49539	1.983194	2.287414	2.816036
Jarque-Bera	1013.994	6.408811	3.889936	7.102225
Probablity	0.000000	0.040583	0.142992	0.028693
Sum	37942.24	4957784	1907412	4554753
Sum Sq. Dev.	26165551	5.51E+10	9.95E+09	2.83E+10
Observations	144	144	144	144