

RESEARCH PAPER

Economic Assessment of Policy Reforms on Agricultural Credit Growth in Southern India

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ABSTRACT

Agricultural credit plays a vital role in supporting Indian agriculture, and to enhance farmers' access to formal credit, several reforms have been introduced. This study examines the response of agricultural credit to policy reforms using data on outstanding agricultural credit from scheduled commercial banks in the southern region during 1976-2021. It also investigates the distribution of agricultural credit beyond the regional level, revealing a concentration of half the advances in just 100 districts, primarily in the Southern region. To identify distinct phases, the study employed the Bai-Perron test, which identified multiple structural breaks in 1983, 1990, 1997, 2004, and 2011. Garrett scores are then calculated for each phase to determine periods of high growth. Notably, Phase-V (2004-2010) recorded the highest agricultural credit growth, attributed to policy reforms such as doubling the volume of credit, ground-level credit policies, interest subvention, and prompt repayment incentives. Phase-I (1976-1982) also witnessed significant growth, driven by policies like establishing regional rural banks, intensifying priority sector lending targets, and nationalizing banks for the second time. This study underscores the importance of direct credit reforms in augmenting agricultural credit accessibility and emphasizes the need for continued efforts in this direction.

HIGHLIGHTS

- ① Concentration of half of the advances to agriculture in only 100 districts, with the top ten districts belonging to the southern region.
- ② Bai-Perron test identifies 1983, 1990, 1997, 2004, and 2011 as the most common breaks in the time series data of agricultural credit.
- ③ Significant growth in agricultural advances observed during phase-V (2004-2010) due to policies such as doubling the volume of credit, ground level credit policy, interest subvention, and prompt repayment incentives.

Keywords: Agricultural credit, Scheduled commercial banks, Cluster analysis, Bai-Perron test, Garret rank

In Indian agriculture, institutional credit plays a significant role, leading to positive impacts on agricultural productivity, capital formation, agricultural GDP, and ultimately the welfare of farmers (Bisaliah and Dev, 2010; Chand and Kumar,

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2004). The accessibility of institutional credit to the agricultural sector has shown substantial growth, increasing from 10.20% in 1951 (RBI, 1954) to 72% in 2016-17 (NABARD, 2017; RBI, 2019). Scheduled commercial banks (SCBs) and co-operatives serve as the primary institutional sources of credit for agriculture in India. Non-institutional credit sources include private money lenders, landlords, traders, input suppliers, relatives, and friends. In the fiscal year 2020-21, institutional credit for agriculture in India predominantly originated from SCBs, accounting for 87.90%, followed by co-operative banks at 12.10%. SCBs comprise nationalized banks, the State Bank of India, regional rural banks, private sector banks and foreign banks.

The agricultural credit landscape in India has undergone significant changes due to various credit policy reforms. These reforms have aimed to increase the amount of credit supply, diversify the sources of credit, and improve the mode of credit delivery. As a result, farmers in the country have benefited from more affordable credit obtained from institutional sources, gradually reducing their reliance on expensive non-institutional sources (Hoda and Terway, 2015). However, despite this impressive growth, a significant number of farmers still depend on non-institutional sources. For every 1000 cultivator households, 338 households are indebted to institutional sources, while 215 households are indebted to non-institutional sources. This indicates that a substantial portion of farmers continues to rely on non-institutional sources, which often come with higher interest rates. In rural India, the incidence of indebtedness is reported to be high, particularly in the category of interest rates exceeding 30% (GoI, 2014). Interestingly, rural households still turn to non-institutional sources even when faced with higher interest rates. This can be attributed to the insufficient and cumbersome supply of agricultural credit from institutional sources (Mishra, 2008). Therefore, despite the progress made, there is a need to address the challenges associated with the availability and accessibility of agricultural credit from institutional sources to reduce farmers' dependence on costly non-institutional credit.

In the post-independence era, the Indian government placed significant emphasis on priority sector lending (PSL) by setting PSL targets of 33.33% and 40% to be achieved by March 1979 and March 1985,

respectively, as mandated by the Reserve Bank of India (RBI). The nationalization of 14 banks in 1969, followed by 6 more banks in 1980, as well as the introduction of the lead bank scheme, service area approach, and annual credit plan, were all aimed at increasing access to credit for the rural population. In 1975, regional rural banks (RRBs) were established, followed by the establishment of the National Bank for Agriculture and Rural Development (NABARD) in 1982 to strengthen rural finances. The Kisan Credit Card (KCC) was introduced in 1998 to provide hassle-free credit to the farming community. Additionally, in 2004, the ground level credit (GLC) policy was implemented, along with the objective of doubling the volume of credit to agriculture by 2006-07, to enhance the availability of agricultural credit. These policy measures were implemented to facilitate easier access to credit and increase credit availability for the farming community. However, it is crucial to assess the growth in agricultural credit during different periods in response to these policy interventions. Furthermore, grouping districts based on agricultural credit exposure is necessary to develop a policy framework that ensures equitable distribution of credit across the country.

MATERIALS AND METHODS

This study focuses on the outstanding agricultural credit by scheduled commercial banks (SCBs) in the southern region of India, which has received more than one-third of the total credit flow to agriculture in the country. Data for the study is extracted from the basic statistical returns of SCBs issued by the Reserve Bank of India (RBI) covering the period from 1976 to 2021. To analyse the district-wise outstanding agricultural credit by SCBs in the southern region, Ward's hierarchical clustering technique is employed. This technique helps in grouping districts based on their credit patterns using the R software. Additionally, the Bai and Perron test is utilized to identify unknown breaks in the outstanding credit to agriculture. The test, conducted using the "strucchange" package in R software, helps identify structural changes in the data (Bai and Perron, 2003). Structural form of the test is,

$$y_i = z_i' \delta_j + u_i$$

where, $t = T_1, \dots, T_m$

$T_1, \dots, T_m$ are break years explicitly regarded as unknown,

m is the number of breaks; y_t is the observed dependent variable at time t ,

z_t ($q \times 1$) are vector of covariates; δ_j is the corresponding vector of coefficients and

u_t is the disturbance term at time t .

In this study, the compound annual growth rate (CAGR) is employed to assess the growth in the time series data on outstanding credit to agriculture by scheduled commercial banks (SCBs) across the districts of the southern region. By utilizing the CAGR, this study provides valuable insights into the growth trends of outstanding credit to agriculture by SCBs in the districts of the southern region, highlighting any variations or patterns that may exist across different phases or time intervals.

The formula is;

$$Y_t = ab^t e^{u_t}$$

where, Y_t is credit outstanding to agriculture at time t , a is intercept, b is regression coefficient, t is time variable and u_t is error term corresponding to t^{th} observation.

Garret ranking technique is utilized to rank the phases based on the growth rate of outstanding credit to agriculture in districts of each category, namely high, medium, and low. Each district's phases are ranked in ascending order based on their respective growth rates, with the highest-growth phase assigned rank 1, the next highest-growth phase assigned rank 2, and so on. To facilitate further analysis, the ranks are converted to percent positions using a specific formula. The percent position represents the relative position of each phase's growth rate within its category.

$$\text{Per cent position} = \frac{100 * (R_{ij} - 0.5)}{N_j}$$

Where, R_{ij} = Rank given for i^{th} phase corresponding to j^{th} district and N_j = Number of phases ranked for j^{th} district.

The percent positions obtained from the Garret ranking technique are further converted into scores using a table provided by Garret and Woodworth (Garrett and Woodworth, 1969). These scores represent the relative strength or performance of each rank within its category. For each phase, the scores of individual districts are summed up, and the total is divided by the total number of districts. This calculation yields the mean scores for each phase. These mean scores are then ranked based on a decision criterion that assigns higher ranks to phases with higher values.

RESULTS AND DISCUSSION

Agency-wise Credit Flow to the Agricultural Sector in India

In India, commercial banks, including public sector banks and private banks (including foreign banks), play a significant role in providing credit to the agriculture sector, accounting for approximately 75% of the total credit (Table 1). In recent years, these commercial banks have emerged as major financiers in the agriculture sector. On the other hand, the share of cooperative banks in agricultural credit has declined from 16.43% to 12.74% between 2013 and 2018. Despite this decline, cooperative banks still maintain a significant outreach at the grassroots level, particularly catering to the needs of small and marginal farmers (Mehrotra, 2011). Regional Rural Banks (RRBs) have a share in credit flow to the agriculture sector that is on par with cooperative banks. However, in this study, the district-wise analysis includes only advances by scheduled commercial banks (commercial banks and RRBs together). The data for district-wise advances by cooperative banks is not available in the public domain.

Table 1: Agency-wise share of credit flow to Agricultural sector in India

Source/ Agency	2016- 2017	2017- 2018	2018- 2019	2019- 2020	2020- 2021
Cooperative banks	13.40	12.87	12.12	11.30	12.10
RRBs	11.56	12.06	11.91	11.87	12.06
Commercial banks	75.04	75.07	75.97	76.83	75.84

Region-wise credit flow to the agricultural sector by SCBs in India

Analysing region wise share of agricultural credit helps in knowing existing pattern of credit distribution and to address disparity if any. The triennium average of 2018-19 to 2020-21 is presented in the pie chart (Figure 1), where Southern region itself received more than one third of credit flow to agriculture in India because of better infrastructure facilities, better outreach and credit availability. North-eastern (1%) region have claimed to be having low share in total credit flow to agriculture because of very low total cultivable area and nature of property right (community ownership of land) (Kumar, 2021). Northern (19%) and Central (18%) region also received a considerable chunk of credit. In general the major reasons for this regional imbalance are difference in cultivable area, wide-ranging potential for agriculture and allied activities, varied levels of deposits, credit-deposit ratio and functioning SCBs branches (RBI, 2019; Roy, 2001).

Analysing the regional share of agricultural credit is crucial in understanding the current pattern of credit distribution and addressing any disparities that may exist. The pie chart in Figure 1 presents the triennium average of credit flow to the agricultural sector from 2018-19 to 2020-21. Notably, the Southern region alone received more than one-third of the total credit flow to agriculture in India. This can be attributed to better infrastructure facilities, improved outreach, and greater availability of credit in the region. Conversely, the North-eastern region accounted for a mere 1% share in the total credit flow to agriculture. This low share can be attributed to factors such as a significantly smaller cultivable area and the nature of property rights, including community ownership of land (Kumar, 2021). The Northern and Central regions received a considerable portion of credit, with 19% and 18% respectively. Several factors contribute to this regional imbalance. Differences in cultivable area, varying potentials for agriculture and allied activities, levels of deposits, credit-deposit ratios, and the functioning of SCB branches all play a role (RBI, 2019; Roy, 2001). These factors collectively influence the credit flow and distribution across regions.

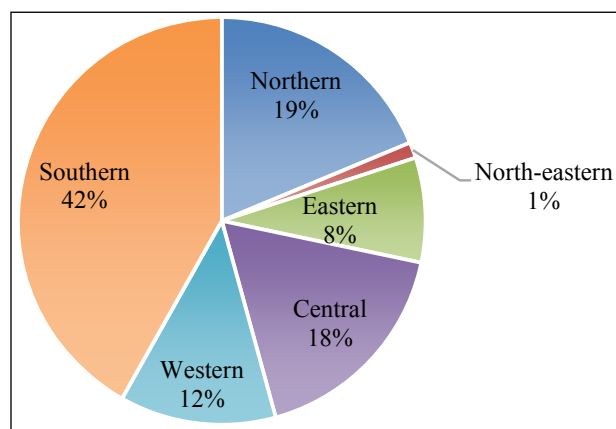


Fig. 1: Region wise share in outstanding credit of SCBs to agriculture TE 2018-21

State wise Credit Outstanding to Agriculture by SCBs

Individual state-wise analysis of credit outstanding to agriculture plays a crucial role in addressing the disparity across states. During the triennium period from 2018-19 to 2020-21, major states such as Tamil Nadu, Uttar Pradesh, Andhra Pradesh, Maharashtra, and Karnataka emerged as significant recipients, collectively receiving nearly half of the credit from scheduled commercial banks (SCBs) for agricultural purposes (Table 2). On the other hand, Union Territories (UTs) such as Lakshadweep, Daman & Diu, Dadra & Nagar Haveli, Andaman & Nicobar, and Ladakh, along with northeastern states like Sikkim, Arunachal Pradesh, Nagaland, Mizoram, and Manipur, received the least advances for agriculture. This can be attributed to the predominantly urban nature of most UTs, where the potential for agriculture and allied activities is limited. As a result, the penetration of credit for the agricultural sector in these regions is observed to be relatively low (RBI, 2019).

Table 2: State wise outstanding credit of SCBs to agriculture (TE average 2018-21)

Sl. No.	State	Agricultural credit outstanding by SCBs (Crores)	Share (%)
1	Tamil nadu	189945.5	13.45
2	Uttar Pradesh	148303.3	10.50
3	Andhra Pradesh	137696	9.75
4	Maharashtra	109196.2	7.73
5	Karnataka	108826.4	7.71

6	Rajasthan	98649.94	6.99
7	Kerala	78931.03	5.59
8	Madhya Pradesh	75560.65	5.35
9	Telangana	72534.58	5.14
10	Punjab	67713.65	4.80
11	Gujarat	65005.23	4.60
12	Haryana	50695.84	3.59
13	Bihar	44220.94	3.13
14	West Bengal	42379.86	3.00
15	NCT of Delhi	30187.87	2.14
16	Others	92142.64	6.53
17	Total	1411990	

Clustering of districts based on outstanding credit of SCBs to agriculture

Understanding the impact of credit policies related to agriculture requires an analysis of the growth at the grassroots level, specifically at the district level. To achieve this, the districts were grouped based on their extent of agricultural credit exposure. The average agricultural credit outstanding by scheduled commercial banks (SCBs) in 711 districts during the triennium period of 2018-2021 was subjected to cluster analysis. The cluster analysis, based on Euclidean distance, classified the districts into three distinct clusters. The first cluster, referred to as the high exposure group, consisted of 100 districts, accounting for half of the total advances to agriculture by SCBs (Table 3). Notably, nine out of the top ten districts in terms of exposure are from the southern region, with seven of them belonging to Andhra Pradesh alone. These districts contribute to 7% of the country's outstanding credit to agriculture by SCBs (Table 4).

Table 3: Clustering of districts and share of agricultural credit outstanding (TE Avg. 2018-21)

Cluster	Range (in Crore ₹)	Number of districts	(%)
I	3981.47-18346.29	100	49.97
II	1619.30-3719.28	185	33.23
III	0.08-1595.04	426	16.80

The high irrigation coverage in districts like West Godavari (90.05%), East Godavari (70.32%), Guntur (58.85%), and Krishna (51.32%) has facilitated significant direct financing. In Mumbai, indirect finance holds a substantial share (45.03%) due to its

economic potential. The second cluster, known as the medium exposure group, comprises 185 districts and accounts for approximately one-third of the agricultural advances by SCBs. The remaining 426 districts form the third cluster, referred to as the least exposure group, with a share of just 16.80% (Table 3).

Table 4: Top ten districts with agricultural credit outstanding by SCBs (TE Avg. 2018-21)

Sl. No.	District	Agricultural credit outstanding by SCBs (In crores)	Share (%)
1	Mumbai	18346.28	1.31
2	Guntur	16846.98	1.20
3	Krishna	15549.09	1.11
4	West Godavari	15200.68	1.08
5	East Godavari	14423.72	1.03
6	Prakasam	12476.57	0.89
7	Hyderabad	12396.28	0.88
8	Chittoor	11606.12	0.83
9	Anantapur	11516.91	0.82
10	Coimbatore	11478.03	0.82

Structural breaks and Growth of agricultural credit in Southern region of India

The Bai-Perron test identified five major and commonly occurring breaks in the district-wise agricultural credit outstanding time series: 1983, 1990, 1997, 2004, and 2011. Based on these breaks, the time series was divided into six phases: Phase-I (1976-1982), Phase-II (1983-1989), Phase-III (1990-1996), Phase-IV (1997-2003), Phase-V (2004-2010), and Phase-VI (2011-2021). The compound annual growth rate (CAGR) was calculated for each phase to assess the rate of growth in outstanding agricultural advances in the selected districts of the southern region (Table 5).

To ensure representative selection, the districts from each state in the southern region were subjected to cluster analysis based on the triennium average of district-wise outstanding credit from 2018-19 to 2020-21. To avoid the misclassification that could occur by using a single year data, triennium average of district wise outstanding credit was arrived which nullifies the problem of extremities in weather which would have occurred in a single year and it is used for clustering. This resulted

in the grouping of districts into three clusters representing high, medium, and low exposure to agricultural credit. From each cluster, one district with minimal disturbances in terms of geographical area was selected.

The phase-wise CAGR analysis revealed significant and positive growth in credit outstanding across almost all districts and phases (Table 5). To rank the phases based on the CAGR of the districts,

the Garret ranking technique was employed. Further to rank the phases based on the CAGR of districts, Garret ranking technique was engaged. For each district the phases are ranked in ascending order and mean Garret scores were obtained by using per cent position formula and Garret table (Table 6). The districts of Hyderabad, Mahbubnagar, and Adilabad in Telangana were selected as representatives for high, medium, and low exposure

Table 5: Phase-wise CAGR (%) of selected districts of Southern region

Phase	State	High exposure	Medium exposure	Low exposure
Phase-I (1976-1982)	Telangana	Hyderabad(31.32**)	Mahbubnagar (42.95**)	Adilabad (36.40**)
	Puducherry	Puducherry(19.77**)	Karaikal (18.18**)	Yanam (12.81 ^{ns})
	Tamil nadu	Coimbatore(9.79**)	Dharmapuri (20.14**)	Nilgiris (24.85**)
	Kerala	Ernakulam(20.97**)	Kozhikode (18.36**)	Idukki (43.87**)
	Karnataka	Belgaum(20.11**)	Gulbarga (42.91**)	Uttar Kannad (37.08**)
	AP	Guntur (6.88*)	Cuddapah (24.66**)	Srikakulam (17.81**)
Phase-II (1983-1989)	Telangana	Hyderabad(24.53**)	Mahbubnagar (14.47**)	Adilabad (2.90 ^{ns})
	Puducherry	Puducherry(16.41**)	Karaikal (18.22**)	Yanam (20.45**)
	Tamil nadu	Coimbatore(25.27**)	Dharmapuri (24.94**)	Nilgiris (16.48*)
	Kerala	Ernakulam (20.40**)	Kozhikode (15.66**)	Idukki (14.16**)
	Karnataka	Belgaum (18.35**)	Gulbarga (22.12**)	Uttar Kannad (17.72**)
	AP	Guntur (17.58**)	Cuddapah (16.22**)	Srikakulam (13.02**)
Phase-III (1990-1996)	Telangana	Hyderabad (12.19 ^{ns})	Mahbubnagar (12.67**)	Adilabad (14.61**)
	Puducherry	Puducherry (5.21 ^{ns})	Karaikal (13.74**)	Yanam (16.82**)
	Tamil nadu	Coimbatore (6.54**)	Dharmapuri (11.57**)	Nilgiris (7.23**)
	Kerala	Ernakulam (14.28**)	Kozhikode (8.25**)	Idukki (6.31**)
	Karnataka	Belgaum (9.99**)	Gulbarga (10.30**)	Uttar Kannad (4.65 ^{ns})
	AP	Guntur (5.41*)	Cuddapah (8.15**)	Srikakulam (7.15**)
Phase-IV (1997-2003)	Telangana	Hyderabad (10.92**)	Mahbubnagar (10.53**)	Adilabad (17.51**)
	Puducherry	Puducherry (-7.29 ^{ns})	Karaikal (-9.40 ^{ns})	Yanam (0.68 ^{ns})
	Tamil nadu	Coimbatore(12.62**)	Dharmapuri (9.77**)	Nilgiris (7.23**)
	Kerala	Ernakulam (13.53**)	Kozhikode (12.41**)	Idukki (17.92**)
	Karnataka	Belgaum (13.20**)	Gulbarga (16.16**)	Uttar Kannad (11.94**)
	AP	Guntur (18.69**)	Cuddapah (12.52**)	Srikakulam (17.13**)
Phase-V (2004-2010)	Telangana	Hyderabad (25.42**)	Mahbubnagar (30.76**)	Adilabad (30.05**)
	Puducherry	Puducherry(30.58**)	Karaikal (36.80**)	Yanam (38.70**)
	Tamil nadu	Coimbatore (36.01*)	Dharmapuri (26.05**)	Nilgiris (29.45**)
	Kerala	Ernakulam (42.70**)	Kozhikode (21.95**)	Idukki (26.26**)
	Karnataka	Belgaum (27.17**)	Gulbarga (31.51**)	Uttar Kannad (20.90**)
	AP	Guntur (26.78**)	Cuddapah (27.07**)	Srikakulam (26.18**)
Phase-VI (2011-2021)	Telangana	Hyderabad (5.48 ^{ns})	Mahbubnagar (-1.10 ^{ns})	Adilabad (7.48*)
	Puducherry	Puducherry(14.42**)	Karaikal (13.21**)	Yanam (26.97**)
	Tamil nadu	Coimbatore(11.29**)	Dharmapuri (13.96**)	Nilgiris (11.56**)
	Kerala	Ernakulam (7.84**)	Kozhikode (14.05**)	Idukki (14.95**)
	Karnataka	Belgaum (10.54**)	Gulbarga (10.88**)	Uttar Kannad (12.77**)
	AP	Guntur (11.17**)	Cuddapah (14.03**)	Srikakulam (16.38**)

Note: **significant @1%, *significant @ 5%, ^{ns}non-significant, values in parenthesis are CAGR (%).

Table 6: Phase-wise Garret score and rank in Southern region

Phase	High		Medium		Low		Overall	
	MGS	Rank	MGS	Rank	MGS	Rank	MGS	Rank
Phase-I (1976-1982)	56.67	2	64.67	2	65.67	2	62.33	2
Phase-II (1983-1989)	55.50	3	57.00	3	43.17	4	51.89	3
Phase-III (1990-1996)	33.00	6	33.00	6	33.00	6	33.00	6
Phase-IV (1997-2003)	43.33	4	33.83	5	40.83	5	39.33	5
Phase-V (2004-2010)	74.67	1	70.83	1	68.50	1	71.33	1
Phase-VI (2011-2021)	36.83	5	39.17	4	47.33	3	41.11	4

Note: MGS = Mean garret score.

categories. In Phase-V (2004-10), these districts experienced CAGRs of 25.42%, 30.76%, and 30.05%, respectively. The high growth observed in Phase-V can be attributed to several policy measures implemented during that period. The ground-level credit (GLC) policy framework, along with the goal of doubling the volume of credit to agriculture in a short span, served as major stimuli for this growth. Other schemes such as the Interest Subvention Scheme (ISS) and the Prompt Repayment Incentive (PRI) scheme incentivized farmers to avail credit at lower costs. Despite a decline in the number of new loans due to the implementation of the Agricultural Debt Waiver and Debt Relief Scheme in 2008, these policies contributed significantly to the growth of agricultural advances by SCBs in the southern region (Gine & Kanz, 2017).

The next highest growth was observed in Phase-I (1976-82) across all district categories. This phase saw remarkable growth due to the establishment of Regional Rural Banks (RRBs) and an increase in priority sector lending (PSL) targets. The nationalization of six additional banks in 1980 also played a role in stimulating credit growth. Phase-III (1990-96) reported the least growth compared to other phases, likely due to the absence of major policies aimed at increasing agricultural advances and the initiation of the first nationwide farm loan waiver during this phase.

CONCLUSION

The analysis provided distinct groups of districts

which help in framing policies accordingly to minimize the regional imbalances and achieve the goal of sufficient and cheaper institutional credit by targeting such less exposed and potential districts for agricultural credit. From the analysis of selected districts of southern region remarkable growth in advances by SCBs was observed during fifth phase i.e., 2004-10 owing to direct policy measure like doubling the volume of credit to agriculture policy and indirect policy measures like GLC policy framework and incentive schemes like ISS scheme and PRI. Policy measures like establishment of RRBs, intensification PSL targets and second round nationalisation of banks have also induced the growth in agricultural advances in southern region in phase-I. To further enhance accessibility and availability of institutional credit to the agricultural sector in India, there is a need for such direct measures.

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