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## Impact of financial inclusion initiatives on agriculture specific business performance of financial institutions in Karnataka

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### Abstract

The present study attempted to analyse the possible structural change in the business performance specific to agriculture/ rural situation between period I (pre financial inclusion period) (between 1995-96 and 2004-05) and period II (financial inclusion period) (between 2005-06 and 2016-17). For this purpose, first, the growth rates in respect of important financial parameters such as number of agricultural credit accounts, number of rural bank branches, total agricultural credit and total rural deposits for both the periods were computed as indicators of change in business performance due to financial inclusion. Next, chow test was conducted to ascertain whether the growth rates were significantly different between the two periods. The results of this analysis are presented here under. The study found that, F values for chow test indicated that the growth rates during period II were not only of higher magnitude, but also were statistically significant from the growth rates of period I. This pointed out that because of financial inclusion initiative, there was a structural change in the business environment between the two periods, which resulted in significantly higher growth rates in period II.

**Keywords:** financial inclusion, banking performance, impact, financial initiatives

### Introduction

Financial inclusion is the process of ensuring access to appropriate financial products and services needed by all sections of the society in general and vulnerable groups such as weaker sections and low income groups in particular at an affordable cost in a fair and transparent manner by mainstream institutional players. In advanced economies, financial inclusion is more about the knowledge of fair and transparent financial products and a focus on financial literacy. In emerging economies, it is a question of both access to financial products and knowledge about their fairness and transparency. It has been universally accepted that developing financial sector and improving access to financial services accelerate economic growth and help to achieve inclusive growth. The financial services can make a great difference to poor and low income families and enable them to have better nutrition, housing, education, health care and improve their standard of living. Thus, financial inclusion can act as an effective instrument to alleviate poverty in the world, particularly in developing and underdeveloped countries. The financial inclusion, therefore, has become an issue of worldwide concern as a large section of the population has no access to formal financial services. According to NSSO Survey (59<sup>th</sup> round), out of 6 (six) lakh habitations in India, only about 30,000 had commercial bank branches with only 26.2 per cent of the rural population covered through bank accounts. Out of 89.3 million farmer households, about 45.9 million (51.4 per cent) did not have access to credit either from credit institutions or from non-institutional sources. Of the total farmer households, only 27% had access to formal sources of credit; one third of this group also borrowed from non-formal sources. Overall, 73% of farmer households had no access to formal sources of credit. Financial exclusion is most acute in central, eastern and north-eastern regions having a concentration of 64% of all financially excluded farmer households in the country. The exclusion is noticeable predominantly in large sections of rural areas and slums in urban areas (Chattopadhyay, 2011) <sup>[1]</sup>.

The problem of financial exclusion is not exclusive to the developing countries. The developed countries too have been affected by it and many poor and disadvantaged people in the world still lack access to financial services. However, the type, degree and magnitude differ between the two worlds. Therefore, emphasis has been on empowerment of the disadvantaged groups for access to public goods and services including banking services in the developed countries. The United Nations general assembly had designated the year 2005 as the international year of micro credit stating that the year will be an important opportunity to give impetus to micro

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finance programmes throughout the world. Thus, the international year of micro credit 2005 aimed at 'building inclusive financial sectors to achieve the millennium development goals'.

The nexus between economic growth, financial deepening and financial inclusion has been well recognized in India's development strategy, particularly when the financial and economic reforms process was initiated in early 1990s. A more focused and structured approach towards financial inclusion has been, in effect, followed since the year 2005, when the Reserve Bank of India decided to implement policies to promote financial inclusion and urged the banking system to focus on this goal. The concept of financial inclusion has a special significance for a fast emerging economy such as India, as it encompasses a large segment of the productive sectors of the economy under formal financial network to unleash their creative capacities. Over a period of time, several financial and economic policy measures are being taken up by the banks in India to improve access to affordable financial services through financial education, awareness generation, business communication networking and leveraging technology (Mani, 2015) [4]. Some of the measures taken in this direction such as opening of No- Frills Accounts, use of intermediaries called Business Correspondents (BCs), branch licensing, introduction of General Credit Cards (GCC), formation of Joint Liability Groups (JLG), strengthening of Self-Help Groups (SHG) and Kisan Credit Cards (KCC), establishment of Financial Literacy and Credit Counselling Centers (FLC), Pradhan Mantri Jan Dhan Yojana (PMJDY) etc.

The concept of financial inclusion was first conceived in 2005-06. Thereafter, different components of financial inclusion were initiated from time to time with the objective of covering all households in the country under banking fold. Thus, it was felt instructive to analyse the impact of financial inclusion initiatives on business performance of financial institutions in Karnataka with the following specific objective.

1. To analyse the business performance of financial institutions prior to and during financial inclusion periods specific to agriculture sector.

**Methodology**

To accomplish the objectives of the study, time series data was used for the both at district level and Karnataka state as a whole during for the period from 1995-96 to 2016-17. For the analysis, important banking indicators such as number of agricultural credit accounts, number of rural bank branches, total agricultural credit and total rural deposits in banks were considered and they were extracted from the basic statistical returns of RBI.

**Techniques**

**Chow Test**

Impact of policy intervention on a time series is assessed by Chow test. In the present study, impact of implementation of financial inclusion plan on the growth of certain indicators is assessed using this test. Under this test, the time series is divided into two time chunks taking a particular year as a benchmark. In the present study, the whole process is divided into prior and during financial inclusion period.

Accordingly, time series data on the total number of agricultural credit accounts, total number of rural bank branches, total agricultural credit, total rural deposits are divided into prior financial inclusion period (1995-96 to 2004-

05) and during financial inclusion period (2005-06 to 2016-17). After obtaining two separate time chunks, compound growth rates were estimated for various financial indicators. Chow test was then applied to assess whether growth rates were significantly different between two separate periods because of introduction of financial inclusion plan.

The test procedure involves estimating a semi-log linear time-trend models of the form:

**Period 1995-96 to 2004-05**

$$\ln(Y_{1t}) = \alpha_0 + \alpha_1 X_{1t} + u_{1t} \dots\dots\dots(1)$$

**Period 2005-06 to 2016-17**

$$\ln(Y_{2t}) = \delta_0 + \delta_1 X_{2t} + u_{2t} \dots\dots\dots(2)$$

**Period 1995-96 to 2016-17**

$$\ln(Y_t) = \beta_0 + \beta_1 X_t + u_t \dots\dots\dots(3)$$

Where,

$\ln(Y_{1t}), \ln(Y_{2t}), \ln(Y_t)$  = Natural log of financial inclusion indicators for which growth has to be estimated during first, second and entire period (pooled), respectively

$t_{1t}, t_{2t}, t_t$  =time period of first, second and entire period, respectively.

$u_{1t}, u_{2t}, u_t$ = error terms for first, second and entire period, respectively.

This test assumes that:

- a) The errors  $u_{1t}$  and  $u_{2t}$  in two sub-periods are normally distributed with the same variance.
- b) The two error terms are  $u_{1t}$  and  $u_{2t}$  are independently distributed.

The test statistic for chow test is computed as follows using residual sum of squares from three regressions as follows:

$$F_{cal} = \frac{(RSS_R - RSS_{UR})/k}{(RSS_{UR}) / (n_1 + n_2 - 2k)} \sim F [k, (n_1 + n_2 - 2k)]$$

F statistics follows the F distribution with k and  $n_1 + n_2 - 2k$  degrees of freedom in the numerator and denominator.

Where,

$RSS_R$  = Residual sum of square obtained from the regression for the pooled observations (Entire period)

$RSS_{UR} = RSS_1 + RSS_2$ , where

$RSS_1$  = Residual sum of square obtained from the regression with first set of observation ( $n_1$ )

$RSS_2$  = Residual sum of square obtained from the regression with first set of observation ( $n_2$ )

k = Number of parameters

$n_1$  = Sample size for pre-financial inclusion period

$n_2$  = Sample size for during financial inclusion period

The following null and alternative hypotheses were used in applying Chow test:

Null Hypothesis ( $H_0$ ): There is no significant change in growth rates of financial inclusion indicators between two periods.

Alternative Hypothesis ( $H_1$ ): There is significant change in growth rates of financial inclusion indicators between two periods.

On the other hand, there is difference in the coefficients obtained from prior to and during financial inclusion plan implementation period.

**Definitions of terms and concepts used**

**Number of agricultural credit accounts:** It is computed as the summation of direct and indirect agricultural credit accounts.

**Number of rural bank branches:** It is computed as the summation of rural and semi-urban bank branches.

**Total agricultural credit:** It is computed as the summation of direct and indirect agricultural credit outstanding.

**Total rural deposits:** It is computed as the summation of rural and semi-urban deposits.

**Results and Discussion**

The business performance of financial institutions prior to and during financial inclusion periods was assessed in two ways. First, percentage increase in the number of agricultural credit accounts, the number of rural bank branches, amount of agricultural credit and amount of rural deposits was assessed between 2004-05 (the year prior to the beginning of financial inclusion period) and 2016-17. This analysis was carried out for each district in the state. Second, the business performance was also analysed by computing the growth rates for the above variables separately for pre financial inclusion period (1995-96 to 2004-05) and financial inclusion period (2005-06 to 2016-17), and then chow test was conducted to ascertain whether the growth rates were significantly different the two periods. These results and discussions are presented hereunder.

It may be noted that, under this section the period between 1995-96 and 2004-05 is referred to as period I and the period between 2005-06 and 2016-17 is referred as period II hereafter.

**1. Change in the number of agriculture credit accounts, number of rural bank branches, agricultural credit and rural deposits**

In this section, the results presented pertain to the total number of agricultural credit account, the total number of rural bank branches, the total agricultural credit and total rural deposits. As in previous section, in this section also, the findings are reported for two years namely, 2004-05 (the year just prior to the beginning of financial inclusion period and 2016-17 (The latest year of financial inclusion period for which data was available).

Table 1 presents the number of agricultural credit accounts during 2004-05 and 2016-17 along with percentage increases. While the number of agricultural credit accounts was maximum in Kalaburgi district at more than 1,84,000 during 2004-05 it was minimum in Bengaluru Urban district with slightly more than 20,000 accounts. Belagavi and Shivamogga stood second and third in terms of the number of agricultural credit accounts (1,76,362 and 1,03,784 accounts respectively). During 2016-17, Belagavi district had more than 4,30,000 agricultural credit accounts occupying the first

position, while Uttara Kannada district had minimum number of these accounts (65,430). Second and third positions were occupied by Hassan and Tumkur districts. The percentage increase in the number of agriculture credit account between the two years was maximum in Bengaluru Urban district (338.86 %) and minimum in Kalburgi district (34.66%). Second and third positions in this regard were occupied by Dharwad and Chamarajanagar district. The percentage increase for the state a whole was 168 percent.

It is interesting to note that the number of agricultural credit accounts accounts was second highest in Belagavi district during 2004-05, which rose to the first position during 2016-17. Likewise, the relative positions of the districts in the state changed considerably between the two periods. While Kalburgi lost its first position in 2004-05 to Belagavi in 2016-17, Belagavi's second position in 2004-05 was bagged by Hassan in 2016-17. Similarly the third position was enjoyed by Shivamogga in 2004-05 was occupied by Tumkur in 2016-17. The last position in this regard which was assumed by Bengaluru Urban in 2004-05 went to Uttara Kannada in 2016-17. The top positions, however, in respect of percent increases in the number of branches between the two periods were enjoyed by different districts namely, Bengaluru Urban (first position), Dharwad (second position) and Chamarajanagar (third position).

The number of rural bank branches during 2004-05 and 2016-17 along with the percentage increase is presented in table 2. In the year 2004-05, the minimum number of rural branches was observed in Chamarajnar district (56) while Belagavi had the maximum number of rural branches at 250. With 182 branches and 181 branches, Kolar and Udipi occupied second and third positions. In 2016-17 also, Belagavi and Chamarajnar were at the top and bottom respectively with regard to number of rural branches (438 and 114). Second and third positions were occupied by Dakshina Kannada and Uttara Kannada districts. With regard to the percentage increase in the number of rural bank branches between the two years, Bengaluru Urban was in the first position with around 124 percent increase followed by Raichur district and Chamarajanagar district. The district of Kolar showed negative percentage change. For the state as a whole, the percentage increase was 74.06.

The number of rural bank branches during the above two periods in the state, it was interesting to note that Belagavi district which was in the second and first positions during 2004-05 and during 2016-17 respectively in respect of agricultural credit accounts, also enjoyed the toppest position during both the year in respect of rural bank branches. While Kolar and Udipi enjoyed second and third positions in this regard during 2004-05, it was Dakshina Kannada and Uttara Kannada occupying the corresponding positions during 2016-17. The top three positions in respect of percentage increase in the number of rural bank branches between the two years were occupied by Bengaluru Urban, Raichur and Chamrajanagar districts in the descending order. The percentage increase was least in repect of Kalburgi district.

**Table 1:** The number of agricultural credit accounts prior to and during financial inclusion period in Karnataka

Sl No	District	2004-05	2016-17	Growth in 2016-17 compared to 2004-05 (%)
1	Bagalkote	65,308	1,83,741	181.35
2	Bengaluru Rural	75,687	1,60,692	112.31
3	Bengaluru Urban	20,339	89,260	338.86
4	Belagavi	1,76,362	4,30,026	143.83
5	Ballari	86,206	1,55,230	80.07
6	Bidar	49,208	1,19,085	142.00

7	Vijayapura	72,201	1,68,640	133.57
8	Chamarajanagar	30,854	1,10,046	256.67
9	Chikkaballapura#	-	1,37,744	NA
10	Chikmagalur	65,680	1,47,915	125.21
11	Chitradurga	62,211	2,09,063	236.05
12	Dakshina Kannada	51,418	1,11,951	117.73
13	Davangere	77,013	2,53,337	228.95
14	Dharwad	52,395	2,01,888	285.32
15	Gadag	44,141	1,16,650	164.27
16	Kalburgi	1,84,207	2,48,048	34.66
17	Hassan	97,112	3,22,613	232.21
18	Haveri	69,447	1,74,726	151.60
19	Kodagu	40,957	72,100	76.04
20	Kolar	98,125	1,61,404	64.49
21	Koppal	53,417	1,11,426	108.60
22	Mandya	77,693	2,34,397	201.70
23	Mysuru	90,477	2,95,014	226.07
24	Raichur	77,119	1,56,310	102.69
25	Ramanagara#	-	1,52,711	NA
26	Shivamogga	1,03,784	2,27,364	119.07
27	Tumkur	1,02,680	3,16,607	208.34
28	Udupi	33,395	82,951	148.39
29	Uttara Kannada	29,945	65,430	118.50
30	Yadgir#	-	1,10,629	NA
	State	19,87,381	53,26,998	168.04

Note:

1. The figures in 2004-05 indicate the number of agricultural credit accounts existing during the last year of pre financial inclusion period.
2. The figures in 2016-17 indicate the latest number of agricultural accounts reported for financial inclusion period
3. # NA- Not applicable since these districts were formed only during financial inclusion period.

**Table 2:** The number of rural bank branches prior to and during financial inclusion period in Karnataka

Sl No	District	2004-05	2016-17	Growth in 2016-17 compared to 2004-05 (%)
1	Bagalkote	127	208	63.78
2	Bengaluru Rural	111	209	88.29
3	Bengaluru Urban	86	193	124.42
4	Belagavi	250	438	75.20
5	Ballari	129	178	37.98
6	Bidar	72	119	65.28
7	Vijayapura	94	167	77.66
8	Chamarajanagar	56	114	103.57
9	Chikkaballapura#	-	152	NA
10	Chikmagalur	139	202	45.32
11	Chitradurga	116	169	45.69
12	Dakshina Kannada	165	321	94.55
13	Davangere	90	158	75.56
14	Dharwad	71	120	69.01
15	Gadag	63	122	93.65
16	Kalburgi	134	157	17.16
17	Hassan	173	255	47.40
18	Haveri	98	172	75.51
19	Kodagu	113	155	37.17
20	Kolar	182	139	-23.63
21	Koppal	78	131	67.95
22	Mandya	109	192	76.15
23	Mysuru	114	218	91.23
24	Raichur	75	163	117.33
25	Ramanagara#	-	164	NA
26	Shivamogga	121	179	47.93
27	Tumkur	141	237	68.09
28	Udupi	181	266	46.96
29	Uttara Kannada	173	270	56.07
30	Yadgir#	-	108	NA
	State	3261	5676	74.06

Note:

1. The figures in 2004-05 indicate the number of rural bank branches existing during the last year of pre financial inclusion period.
2. The figures in 2016-17 indicate the latest number of rural bank branches reported for financial inclusion period
3. # NA- Not applicable since these districts were formed only during financial inclusion period.

Table 3 presents total agricultural credit during 2004-05 and 2016-17. Bengaluru Urban district and Belagavi district occupied first and second positions respectively in this regard both during 2004-05 and 2016-17. The minimum agricultural credit was reported for Uttara Kannada district in 2004-05 as well as 2016-17. In terms of percentage increase in the total agricultural credit between two years, maximum increase was found in case of Chamrajanagar district (1,250.47 %) followed by Tumkur district and Mysuru district (1,163.45 % and 1,112.97 %). The minimum increase of around 224 percent was seen in the case of Kodagu district.

Interestingly again, Belagavi district emerged to be the second largest district in terms of total agricultural credit outstanding both during 2004-05 and 2016-17. The first positions, however, during both the periods were occupied by Bengaluru Urban districts. It is to be noted that the agricultural credit in this study refers to both direct and indirect agricultural credit. As such, Bengaluru Urban district, which has several agro processing industries, agro input manufacturing units, agro input dealers and agriculture and allied activities such as poultry, dairy, piggery etc. naturally stands first in terms of total agricultural credit. The reasons for Belagavi district assuming the second position include vast sugarcane growing area in the district, large number of sugar factories and large network of agro input dealers to support sugarcane economy of the district.

The total amount of rural deposits during the two years can be seen from table 4. While Udupi had maximum rural deposits of ` 2,95,801 millions, Gadag had the minimum amount of ` 27,011 millions during 2004-05. Second and third positions were occupied by Bengaluru Urban and Dakshina Kannada districts. During 2016-17 also, Udupi occupied first position with much larger amount of rural deposits (`11,23,529 millions). Uttara Kannada and Belagavi were in second and third positions. The minimum amount of ` 32,527.44 millions was reported by Koppal district. The extent of increase in rural deposits was maximum in Raichur district (722.47%) and minimum in Bengaluru Urban district (117%).

The numbers pertaining to 2016-17, the latest year of financial inclusion period considered under the study point out that the amount of rural deposits was highest in respect of Udupi district (`11,23,529 millions) followed by Uttara Kannada and Belagavi districts. Smallest amount of deposits were seen in Koppal district. From the view point of percentage increase in the amount of rural deposits, first, second and third positions were occupied by Raichur, Gadag and Vijayapurs districts. Interestingly, these were the districts, which had relatively small amounts of rural deposits during pre-financial inclusion period. Since they picked up considerably during financial inclusion period, the resulting growth rates were high.

**Table 3:** The total agricultural credit prior to and during financial inclusion period in Karnataka (Millions)

SI No	District	2004-05	2016-17	Growth in 2016-17 compared to 2004-05 (%)
1	Bagalkote	43,902.92	5,24,765.02	1095.29
2	Bengaluru Rural	36,295.30	2,50,150.56	589.21
3	Bengaluru Urban	2,70,971.20	9,53,948.42	252.05
4	Belagavi	87,513.92	8,36,638.25	856.01
5	Ballari	56,554.18	3,33,235.85	489.23
6	Bidar	14,408.61	1,63,286.81	1033.26
7	Vijayapura	50,397.11	3,97,994.16	689.72
8	Chamarajanagar	10,896.68	1,47,156.05	1250.47
9	Chikkaballapura#	-	1,77,996.54	NA
10	Chikmagalur	64,731.81	2,95,567.49	356.60
11	Chitradurga	25,518.82	2,49,206.35	876.56
12	Dakshina Kannada	36,454.00	2,24,325.53	515.37
13	Davangere	38,521.48	3,56,762.53	826.14
14	Dharwad	29,745.31	2,89,113.88	871.96
15	Gadag	19,380.95	2,15,186.36	1010.30
16	Kalburgi	69,586.68	3,32,710.13	378.12
17	Hassan	50,625.17	3,89,070.70	668.53
18	Haveri	26,215.39	2,87,005.40	994.80
19	Kodagu	45,597.44	1,47,929.09	224.42
20	Kolar	36,205.87	2,11,514.04	484.20
21	Koppal	30,163.21	1,94,380.10	544.43
22	Mandya	25,133.4	2,41,980.66	862.79
23	Mysuru	31,817.68	3,85,938.09	1112.97
24	Raichur	45,570.54	3,61,515.98	693.31
25	Ramanagara#	-	1,61,669.04	NA
26	Shivamogga	51,848.67	3,19,562.79	516.34
27	Tumkur	31,575.25	3,98,936.91	1163.45
28	Udupi	14,138.65	1,35,995.07	861.87
29	Uttara Kannada	12,429.12	91,786.56	638.48
30	Yadgir#	-	1,42,740.16	NA
	State	12,56,199	90,23,688.4	633.81

Note:

1. The figures in 2004-05 indicate total rural credit outstanding existing during the last year of pre financial inclusion period.
2. The figures in 2016-17 indicate the latest total rural credit outstanding reported for financial inclusion period
3. # NA- Not applicable since these districts were formed only during financial inclusion period.

**Table 4:** The total rural deposit -prior to and during financial inclusion period in Karnataka (in Millions)

Sl. No	District	2004-05	2016-17	Growth in 2016-17 compared to 2004-05 (%)
1	Bagalkote	1,08,073.00	4,37,170.87	304.51
2	Bengaluru Rural	1,17,583.00	8,09,662.24	588.59
3	Bengaluru Urban	2,73,040.00	5,92,505.29	117.00
4	Belagavi	1,62,306.00	10,54,342.86	549.60
5	Ballari	1,10,327.00	4,31,336.88	290.96
6	Bidar	33,156.00	2,09,149.40	530.80
7	Vijayapura	42,910.00	3,20,591.23	647.12
8	Chamarajanagar	32,246.00	2,30,101.43	613.58
9	Chikkaballapura#	-	3,81,262.77	NA
10	Chikmagalur	1,08,348.00	4,81,984.64	344.85
11	Chitradurga	77,203.00	2,83,656.38	267.42
12	Dakshina Kannada	1,78,742.00	10,46,092.75	485.25
13	Davangere	45,197.00	2,87,749.72	536.66
14	Dharwad	30,610.00	2,04,874.78	569.31
15	Gadag	27,011.00	2,19,766.47	713.62
16	Kalburgi	74,340.00	3,02,221.80	306.54
17	Hassan	1,19,275.00	4,81,407.40	303.61
18	Haveri	63,265.00	3,39,210.74	436.17
19	Kodagu	81,387.00	4,79,760.40	489.48
20	Kolar	1,20,601.00	3,39,747.66	181.71
21	Koppal	48,377.00	32,527.44	-32.76
22	Mandya	54,435.00	3,31,741.76	509.43
23	Mysuru	70,741.00	4,64,762.97	556.99
24	Raichur	37,086.00	3,05,021.04	722.47
25	Ramanagara#	-	6,26,719.01	NA
26	Shivamogga	1,02,592.00	4,78,423.63	366.34
27	Tumkur	79,405.00	4,92,040.80	519.66
28	Udupi	2,95,801.00	11,23,529.16	279.83
29	Uttara Kannada	1,74,119.00	10,87,032.32	524.30
30	Yadgir#	-	2,54,541.30	NA
	State	26,68,176.00	1,41,28,935.14	429.53

Note:

1. The figures in 2004-05 indicate total rural deposit existing during the last year of pre financial inclusion period.
2. The figures in 2016-17 indicate the latest total rural deposit reported for financial inclusion period
3. # NA- Not applicable since these districts were formed only during financial inclusion period.

## 2. Structural change in business performance between pre-financial inclusion period and financial inclusion period

Table 5 reports the growth rates in the number of agricultural credit accounts during periods I and II and shows F values in respect of chow test conducted for structural change between the two periods. The growth rates reported for period I were surprisingly non significant except in the case of Kalburgi district, where the growth was positive and significant (4.88 %). During period I, the growth for the state as a whole was also non significant as expected. On the contrary, all the growth rates except for two cases (Kalburgi district and Yadgir district) were positive and significant. The highest growth rate of 19.41 percent was reported for Ramanagara district, where as the second and third highest growth rates of 16.25 percent and 15.20 percent were reports for Chikkaballapur district and Chamarajanagar district respectively. The minimum growth observed was for Kodagu

district, where it was found to be 6.35 percent. The F values calculated for chow test were all significant except in the case of Udupi district.

The table points out a glaring difference between the two periods when it comes to the growth in the number of agricultural credit accounts. It can be seen that the only significant growth rate observed during period I was in case of Kalburgi district. All others were either positive or negative, but invariably nonsignificant. However, thanks to the financial inclusion drives, all the districts except Kalburgi and Yadgir exhibited significant growth in this regard. The non-significant growth in respect of these two districts could be attributed to the division of Kalburgi district into Kalburgi and Yadgir districts in the year 2010-11 that falls in period II. These findings pertaining to chow test reflected structural change in financial environment between the two periods leading to significantly different growth rates.

**Table 5:** Growth rates and their tests for structural change in respect of the number of total agricultural credit accounts prior to and during financial inclusion period in Karnataka

Sl. No	District	Growth Rate (%)			F value for chow test
		Period I (1995-96 to 2004-05)	Period II (2005-06 to 2016-17)	Overall (1995-96 to 2016-17)	
1	Bagalkote	1.31 <sup>NS</sup>	9.21**	6.71**	20.51**
2	Bengaluru Rural	-4.53 <sup>NS</sup>	14.45**	0.76 <sup>NS</sup>	18.47**
3	Bengaluru Urban	-8.16 <sup>NS</sup>	14.21**	7.46**	22.71**
4	Belagavi	1.84 <sup>NS</sup>	9.51**	6.40**	9.93**
5	Ballari	-0.69 <sup>NS</sup>	11.05**	5.47**	15.29**

6	Bidar	-1.14 <sup>NS</sup>	7.35**	5.19**	11.81**
7	Vijayapura	-4.96 <sup>NS</sup>	7.02**	4.43**	11.13**
8	Chamarajanagar	-0.62 <sup>NS</sup>	15.20**	8.04**	25.13**
9	Chikkaballapura#	-	16.25**	16.25**	-
10	Chikmagalur	0.15 <sup>NS</sup>	7.60**	4.69**	17.39**
11	Chitradurga	-3.37 <sup>NS</sup>	12.12**	6.58**	36.64**
12	Dakshina Kannada	-3.65 <sup>NS</sup>	6.85**	4.51**	11.07**
13	Davangere	1.20 <sup>NS</sup>	12.52**	8.88**	25.35**
14	Dharwad	-9.89 <sup>NS</sup>	11.26**	5.48**	14.19**
15	Gadag	3.07 <sup>NS</sup>	8.56**	8.25**	8.11**
16	Kalburgi	4.88**	-0.64 <sup>NS</sup>	4.83**	5.59*
17	Hassan	-0.37 <sup>NS</sup>	11.54**	6.65**	30.95**
18	Haveri	1.24 <sup>NS</sup>	7.36**	7.01**	12.01**
19	Kodagu	1.31 <sup>NS</sup>	6.35**	3.52**	6.28**
20	Kolar	-2.41 <sup>NS</sup>	9.55**	1.12 <sup>NS</sup>	12.28**
21	Koppal	-0.44 <sup>NS</sup>	10.48**	6.44**	17.07**
22	Mandya	-3.40 <sup>NS</sup>	11.92**	5.22**	50.07**
23	Mysuru	-4.93 <sup>NS</sup>	13.17**	6.33**	42.49**
24	Raichur	-5.36 <sup>NS</sup>	8.01**	4.94**	16.42**
25	Ramanagara#	-	19.41**	19.41**	-
26	Shivamogga	-2.16 <sup>NS</sup>	6.88**	4.80**	13.86**
27	Tumkur	-0.75 <sup>NS</sup>	14.32**	6.82**	43.93**
28	Udupi	2.30 <sup>NS</sup>	8.19**	7.83**	3.47 <sup>NS</sup>
29	Uttara Kannada	0.73 <sup>NS</sup>	6.88**	6.11**	8.94**
30	Yadgir#	-	9.91 <sup>NS</sup>	9.91 <sup>NS</sup>	-
	<b>State</b>	-0.11 <sup>NS</sup>	10.20**	6.33**	43.04**

\*\* 1 percent level of significance; \* 5 percent level of significance; NS-Non significant

Note:

1. Period I: Pre financial inclusion period, Period II: Financial inclusion period.
2. Growth rates for Bagalkote, Chamarajanagar, Davanagere, Gadag, Haveri, Koppal and Udupi were calculated for the years 1997-98 to 2004-05 in period I and 1997-98 to 2016-17 in overall period.
3. #The growth rates for Chikkaballapur and Ramanagar were calculated for the period 2007-08 to 2016-17; they were calculated for 2010-11 to 2016-17 for Yadgir, Chow tests could not be conducted for these three districts since growth rates were not available for both periods.

Table 6 presents the growth rates in respect of the number of rural bank branches in period I and II and the results of chow test for structural change. In this case also, the growth rates in period I were statistically insignificant in all but six cases. The highest significant growth was in the case of Chamarajanagar district, where the extent of growth was 4.07 percent. The second and third positions in this regard were occupied by Koppal district (1.59 %) and Belagavi district (1.28 %). The minimum significant growth rate of 0.37 percent was observed for Chikkamagalore district. During period II, interestingly all the growth rates were statistically significant. The range of the growth rates was from 0.5 percent in Kolar to 13.33 percent in Yadgir district. While Bengaluru Urban held second position with around 12 percent growth, Ramanagara district occupied third position with 10.39 percent growth. It was Kolar district, where the growth was least at 0.5 percent.

It was only Belagavi, Chamrajanagar, Chikmagalore, Hassan and Uttara Kannada districts that revealed positive and significant growth in the number of rural bank branches in period I. This finding is not surprising as the matter of opening of rural bank branches received increased impetus only during period II. Contrary to the observations pertaining to period I, the results of period II indicated positive and significant growth rates in all the cases except that of Kalburgi district highlighting the favorable impact of financial inclusion measures initiated in the country in general and Karnataka in particular. The chow test values testified that period II was significantly different from period I in the matter of rural bank branch expansion.

Table 7 shows the growth rates in total outstanding agricultural credit for various districts of the state during period I and period II. The results of chow test for the

structural change between the periods are also reported in the table. The growth rates during period I were all significant. They were also positive for all the districts except for Chikamagalore district. The districts that occupied top three positions were Bengaluru urban, Gadag and Davangere with 25.33 percent, 20.80 percent and 19.58 percent growth respectively. Mandya district had the minimum growth of 0.41 percent. The state as a whole witnessed 8.49 percent growth in this regard during period I. During period II also, all the districts had significant growth rates, which also were positive. While Chikkaballapur district stood first in terms of growth of outstanding agricultural credit, Ramanagara district occupied second position with slightly smaller growth rate of 30.71 percent. While Yadgiri district was in the third position, Kodagu district stood last with 10.86 percent growth. The state as a whole, had a larger growth (18.12 %) compared to period I. The chow test results, in the case of a majority of districts indicated structural change between the two periods. However, owing to various incentives associated with advances for agriculture sector, the growth rates were higher during period II in around 80 percent of the districts.

Table 8 presents the results of growth rate analysis conducted in respect of total rural deposits over years in period I as well as period II. Also, the results of chow test conducted for structural change between the periods are presented in the table. During period I, the rate of growth in total rural deposits varied between 0.43 percent (Vijayapur district) and 19.08 percent (Bengaluru Urban district). The growth rates for Chamarajanagar and Bengaluru Rural districts, which occupied second and third positions, were 18.46 percent and 17.72 percent respectively. For the state as a whole, the growth rate was 13.78 percent. All these growth rate were statistically significant. During period II also, each district and

the state a whole, had positive and significant growth rates in respect of rural deposits. While the minimum growth was in respect of Bengaluru Urban district (7.81%), the highest growth was in respect of Yadgir district (23.28 %). Chikkaballapur and Gadag districts were found to have second highest and third highest growth rates of 19.81 percent

and 18.50 percent respectively. The chow test results reported in the table were indicative of structural change between the two periods in a majority of cases barring a few exceptions. However, the impact of financial inclusion initiative was evident in that all the cases except 5 indicated that the growth rates of period II were larger than those of period I.

**Table 6:** Growth rates and their tests for structural change in respect of the number of rural bank branches prior to and during financial inclusion period in Karnataka

Sl. No	District	Growth Rate (%)			F value for chow test
		Period I (1995-96 to 2004-05)	Period II (2005-06 to 2016-17)	Overall (1995-96 to 2016-17)	
1	Bagalkote	0.99 <sup>NS</sup>	6.13**	3.78**	29.85**
2	Bengaluru Rural	0.40 <sup>NS</sup>	8.59**	2.69**	13.77**
3	Bengaluru Urban	0.31 <sup>NS</sup>	12.05**	2.54**	7.94**
4	Belagavi	1.28**	5.91**	2.92**	35.94**
5	Ballari	-1.26 <sup>NS</sup>	5.49**	0.87**	73.45**
6	Bidar	-1.15 <sup>NS</sup>	5.69**	1.71**	76.12**
7	Vijayapura	-7.93 <sup>NS</sup>	6.07**	0.58**	18.21**
8	Chamarajanagar	4.07*	8.18**	5.02**	21.39**
9	Chikkaballapura#	-	7.83**	7.83**	-
10	Chikmagalur	0.37**	5.48**	1.50**	74.73**
11	Chitradurga	-3.93 <sup>NS</sup>	5.68**	0.44 <sup>NS</sup>	41.66**
12	Dakshina Kannada	-7.04 <sup>NS</sup>	7.22**	1.88 <sup>NS</sup>	13.32**
13	Davangere	0.67 <sup>NS</sup>	6.34**	2.82**	27.04**
14	Dharwad	-10.65 <sup>NS</sup>	5.57**	-0.10	10.28**
15	Gadag	-0.24 <sup>NS</sup>	6.93**	3.56**	83.65**
16	Kalburgi	0.01 <sup>NS</sup>	0.84 <sup>NS</sup>	0.11 <sup>NS</sup>	0.46 <sup>NS</sup>
17	Hassan	0.63**	6.15**	1.35**	33.16**
18	Haveri	0.44 <sup>NS</sup>	6.88**	3.92**	38.94**
19	Kodagu	0.37 <sup>NS</sup>	3.47**	1.55**	79.45**
20	Kolar	-0.52 <sup>NS</sup>	0.50**	-3.25	4.55*
21	Koppal	1.59 <sup>NS</sup>	6.72**	3.09**	91.13**
22	Mandya	-0.01 <sup>NS</sup>	6.13**	2.50**	30.08**
23	Mysuru	-3.60 <sup>NS</sup>	7.56**	1.76**	42.95**
24	Raichur	-6.33 <sup>NS</sup>	7.78**	2.22**	24.16**
25	Ramanagara#	-	10.39**	10.39**	-
26	Shivamogga	-1.93 <sup>NS</sup>	6.13**	0.89 <sup>NS</sup>	60.81**
27	Tumkur	-0.92 <sup>NS</sup>	5.34**	1.75**	54.33**
28	Udupi	-1.35 <sup>NS</sup>	4.61**	1.98**	39.29**
29	Uttara Kannada	0.59**	4.49**	2.47**	81.24**
30	Yadgir#	-	13.33**	13.33**	-
	State	0.09*	6.54**	2.57**	71.44**

\*\* 1 percent level of significance; \* 5 percent level of significance; NS-Non significant

Note:

1. Period I: Pre financial inclusion period, Period II: Financial inclusion period.
2. Growth rates for Bagalkote, Chamarajanagar, Davangere, Gadag, Haveri, Koppal and Udupi were calculated for the years 1997-98 to 2004-05 in period I and 1997-98 to 2016-17 in overall period.
3. #The growth rates for Chikkaballapur and Ramanagar were calculated for the period 2007-08 to 2016-17; they were calculated for 2010-11 to 2016-17 for Yadgir, Chow tests could not be conducted for these three districts since growth rates were not available for both periods.

**Table 7:** Growth rates and their tests for structural change in respect of total agricultural credit outstanding prior to and during financial inclusion period in Karnataka

Sl. No	District	Growth Rate (%)			F value for chow test
		Period I (1995-96 to 2004-05)	Period II (2005-06 to 2016-17)	Overall (1995-96 to 2016-17)	
1	Bagalkote	17.82	19.47	23.14	8.49**
2	Bengaluru Rural	15.53	19.94	16.44	2.95 <sup>NS</sup>
3	Bengaluru Urban	25.33	11.69	18.48	4.98*
4	Belagavi	13.97	19.92	20.53	25.08**
5	Ballari	17.15	15.99	19.61	5.30*
6	Bidar	9.58	20.93	20.03	40.38**
7	Vijayapura	11.80	17.60	19.23	4.60*
8	Chamarajanagar	16.17	22.64	23.84	9.69**
9	Chikkaballapura#	-	30.76	30.76	-
10	Chikmagalur	-1.29	14.61	7.17	0.62 <sup>NS</sup>
11	Chitradurga	8.31	20.66	18.21	22.46**



12	Dakshina Kannada	12.78	14.73	19.08	8.50**
13	Davangere	19.58	19.78	21.33	3.76*
14	Dharwad	7.75	21.50	18.94	3.76*
15	Gadag	20.80	20.99	24.04	10.34**
16	Kalburgi	19.24	15.91	18.70	0.19 <sup>NS</sup>
17	Hassan	15.71	19.25	17.61	4.00*
18	Haveri	17.34	19.59	21.74	13.49**
19	Kodagu	18.00	10.86	11.91	8.41**
20	Kolar	12.19	17.20	15.63	1.92 <sup>NS</sup>
21	Koppal	18.06	16.98	19.88	7.60**
22	Mandya	0.41	19.86	16.17	4.68*
23	Mysuru	10.26	23.03	20.74	24.80**
24	Raichur	11.98	18.38	19.27	9.68**
25	Ramanagara#	-	30.71	30.71	-
26	Shivamogga	17.58	17.06	18.11	0.64 <sup>NS</sup>
27	Tumkur	10.87	24.22	22.26	11.60**
28	Udupi	16.61	20.16	23.73	4.98*
29	Uttara Kannada	12.46	18.11	18.03	7.52**
30	Yadgir#	-	27.62	27.62	-
	State	8.49	18.12	16.74	1.11 <sup>NS</sup>

\*\* 1 percent level of significance; \* 5 percent level of significance; NS-Non significant

Note:

1. Period I: Pre financial inclusion period, Period II: Financial inclusion period.
2. All growth rates were significant at 1 percent level of significance except Chikmagalur, Dharwad, Mandya and state as a whole in period I which were non-significant.
3. Growth rates for Bagalkote, Chamarajanagar, Davanagere, Gadag, Haveri, Koppal and Udupi were
4. calculated for the years 1997-98 to 2004-05 in period I and 1997-98 to 2016-17 in overall period.
5. #The growth rates for Chikkaballapur and Ramanagar were calculated for the period 2007-08 to 2016-17; they were calculated for 2010-11 to 2016-17 for Yadgir, Chow tests could not be conducted for these three districts since growth rates were not available for both periods.

**Total 8:** Growth rates and their tests for structural change in respect of total rural deposit prior to and during financial inclusion period in Karnataka

Sl. No	District	Growth Rate (%)			F value for chow test
		Period I (1995-96 to 2004-05)	Period II (2005-06 to 2016-17)	Overall (1995-96 to 2016-17)	
1	Bagalkote	10.42	15.77	14.45	2.96 <sup>NS</sup>
2	Bengaluru Rural	17.72	17.47	17.34	0.03 <sup>NS</sup>
3	Bengaluru Urban	19.08	7.81	9.35	2.80 <sup>NS</sup>
4	Belagavi	12.51	17.07	15.30	10.04**
5	Ballari	16.13	15.69	14.09	5.14*
6	Bidar	13.03	15.56	14.17	5.22*
7	Vijayapura	0.43	18.06	11.87	15.08**
8	Chamarajanagar	18.46	17.77	17.14	0.63 <sup>NS</sup>
9	Chikkaballapura#	-	19.81	19.81	-
10	Chikmagalur	10.47	17.18	11.20	166.60**
11	Chitradurga	12.35	16.11	11.19	49.09**
12	Dakshina Kannada	4.04	16.43	12.12	6.25**
13	Davangere	14.54	16.40	15.63	5.19*
14	Dharwad	1.09	17.47	13.46	7.11**
15	Gadag	14.17	18.50	17.60	26.73**
16	Kalburgi	12.31	17.24	14.18	0.28 <sup>NS</sup>
17	Hassan	11.65	16.03	11.01	158.82**
18	Haveri	15.93	16.25	16.79	3.25 <sup>NS</sup>
19	Kodagu	7.48	15.92	12.58	43.87**
20	Kolar	12.48	11.71	7.86	9.29**
21	Koppal	13.02	8.23	11.53	0.37 <sup>NS</sup>
22	Mandya	11.41	16.27	13.97	57.35**
23	Mysuru	8.12	17.17	13.73	71.51**
24	Raichur	4.12	18.28	13.80	22.80**
25	Ramanagara#	-	15.57	15.57	-
26	Shivamogga	12.92	16.90	12.61	114.85**
27	Tumkur	12.36	18.16	14.16	7.12**
28	Udupi	12.70	14.73	11.61	14.02**
29	Uttara Kannada	15.79	16.87	15.82	3.92*
30	Yadgir#	-	23.28	23.28	-
	State	13.78	16.93	14.41	24.26**

\*\* 1 percent level of significance; \* 5 percent level of significance; NS-Non significant

Note:

1. Period I: Pre financial inclusion period, Period II: Financial inclusion period.

2. All growth rates were significant at 1 percent level of significance.
3. Growth rates for Bagalkote, Chamarajnar, Davanagere, Gadag, Haveri, Koppal and Udupi were calculated for the years 1997-98 to 2004-05 in period I and 1997-98 to 2016-17 in overall period.
4. #The growth rates for Chikkaballapur and Ramanagar were calculated for the period 2007-08 to 2016-17; they were calculated for 2010-11 to 2016-17 for Yadgir, Chow tests could not be conducted for these three districts since growth rates were not available for both periods.

### Conclusion

It was clear from the results that the growth rates in the number of rural bank branches and the number of agricultural credit accounts were significantly larger during the financial inclusion period compared to pre financial inclusion period. However, the rate of growth during financial inclusion period in respect of agricultural credit and rural deposits was not significantly higher than that during pre financial inclusion period in the case of some districts. Thus, there is a need to expand agricultural credit disbursement and mobilize rural deposits in such districts.

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