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Abstract

This paper makes a modest attempt to identify structural breaks in outstanding credit of rural branches of Scheduled Commercial Banks in India during the period of 1969 to 2009. With the use of endogenous method, we find three possible structural shifts in growth, i.e. 1981, 1989 and 1999 and thus four different regimes of growth and performance. These structural changes are analyzed with respect to branch licensing policy and priority sector lending by the Schedule Commercial Banks. Empirical evidence and growth performance shows that such policies have been instrumental in changing the off-take of rural credit in a significant way. The study also finds corroborative evidence of break dates and growth performance in evaluating the outcomes of the prevailing banking policies.

Keywords: Trend Break, Time-series, Rural Credit, Branch Licensing Policy, India

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1. INTRODUCTION

This paper makes a modest attempt to identify structural breaks in outstanding credit of rural branches of Scheduled Commercial Banks (SCBs)[1] in India during the period of 1969 to 2009 and analyzes growth phases vis-à-vis banking policies. The subject is related to analysis of policy interventions in banking sector essentially by the governments of less developed countries. It has been a celebrated argument that there lies a high welfare cost of exclusion of under privileged of the society from financial access. This leads to the proposition that reach of banking services in rural areas be considered as a precursor for growth of an economy. Without exception, post independence, India also witnessed several government interventions to ensure credit flow to socioeconomically challenged population both in rural and urban areas. Fourteen SCBs were nationalized in 1969 with further addition of six banks under public ownership in 1980. In 1977 government came out with a policy which stipulated that to open one branch in banked area the particular bank had to open four branches in locations with no prior formal credit and savings institutions (referred as un-banked area). This policy (here after referred as 1:4 branch licensing policy) continued to be operational till 1990. Also from mid sixties government stipulated lending target to agriculture, small scale and cottage industries for SCBs.

While need for these policy intervention to augment credit in rural[2] centers has been at the centre of several discussions for quite a long time, there has been limited empirical investigation to justify the necessity of such policy intervention. Five years ago Burgess and Pande (2005) came out with their scholarly contribution in the field of rural credit by providing empirical evidence that much discussed 1:4 branch licensing policy augmented the flow of rural credit and eventually contributed to poverty alleviation. Not surprisingly, the argument of Burgess and Pande (2005) stirred up much debate. Critics such as Kochar (2005), Pangariya (2006) raised serious reservation regarding identification issue as period of 1:4 branch licensing policy coincides with Integrated Rural Development Programme (IRDP), one of the largest poverty alleviation programme in India. Observing the divergent opinions by scholars in terms of findings and reasoning we approach this issue by presenting

findings of an endogenous method of detecting structural breaks and growth regimes of outstanding credit of rural branches of SCBs. Then attempt to relate the policy perspectives with the observed growth regimes. The main reason is the centrality of credit from formal financial system in Indian agrarian economy, which employs around two third of population.

The structure of the paper is arranged as follows; section II covers the focus of the study and literature review, section III deals with methodology and data, section IV presents the results and their implications, section V discusses policy implications and concludes.

2. FOCUS AND REVIEWS

The focus of the study is on estimating trend breaks in the off-take of credit in rural areas in india, and thus highlighting the perspective of trend breaks. The analysis becomes useful as it arguably furthers our understanding of growth phases and performance. The literature on the aspects of rural credit, empirical investigations and policy analysis is replete with studies and arguments. A survey of few relevant papers and arguments can be taken as follows. Studies of Kumar (2004) and Burgess and Pande (2005) have attempted to address the impact of 1:4 branch licensing policy on rural credit and have critically argued on policy perspectives. Kumar (2004) employed the methodology developed by Perron (1989) to exogenously find a trend break in time series and observed that significant decline in proportion of credit from rural branches to cumulative credit from SCBs after 1991. The study gives a proposition that 1:4 branch licensing policy which was withdrawn in 1990, had it continued, would have pushed the credit off-take in rural areas. Thus a trend break could have been expected around 1991 and possibly marked the start of a new regime.

Burgess and Pande (2005) attempted to find empirical evidence on (a) whether state led 1:4 branch licensing policy had resulted into branch expansion in un-banked area of states with lower number of branch network and, (b) whether this policy had positively contributed towards rural credit disbursement. They considered the number of bank branches in a state in the year 1961 (making it base year) as an indicator of initial financial development. The key findings of Burgess and Pande (2005) rest on their observation that ‘between 1977 and 1990 rural branch licensing was relatively higher in financially less developed states’, which they have attributed to 1:4 branch licensing policy, while ‘the reverse was true before 1977 and

after 1990.' Thus, guided by their profit motive banks had opened branches in developed states till 1977. The same trend was observed again after 1990 when the 1:4 branch licensing policy was withdrawn and banks were permitted to (i) choose branch locations purely on profit motive and (ii) closure of non profitable branches was allowed (RBI, 1991). Their linear trend break models found statistical support of trend reversal for 1977 and 1990, the start and withdrawal of the said policy. Based on this evidence, the authors argued that branch licensing policy had contributed towards opening of additional branches in unbanked area resulting into higher credit disbursement.

Kochar (2005) and Panagariya (2006) have critically assessed the findings of Burgess and Pande (2005) by arguing that incidence of higher credit off-take cannot be attributed solely to the branch licensing policy as during the same period government had put thrust on massive poverty reduction programs such as IRDP. The program was primarily to provide subsidized credit to economically challenged section of the society for income generating activities. Kochar (2005) and Panagariya (2006) argue that isolating the effects of two programs would be difficult as both were operating simultaneously. As bank branch was the primary delivery window in IRDP, government thrust on bringing more number of eligible populations under IRDP had driven opening of more branches in unbanked areas which in turn augmented credit flow in those areas.

Taking these arguments into account, there appears no major consensus on a particular policy behind credit off take in rural centers. Given this backdrop, we make an attempt to understand the underlying trends and growth phases of outstanding credit of rural branches of SCBs. This in turn would help analyze the arguments of banking policies in terms of branch licensing and credit off-take. The approach is to first find structural changes in the long term credit to rural India, revisit the argument of 1:4 branch licensing policy and estimate the growth in separate regimes as led by prevailing banking polices.

Our study also differs from studies of Kumar (2004) and Burgess and Pande (2005) in another dimension. While both the studies use 'proportion of outstanding credit of rural branches to cumulative credit from SCBs', we use the absolute figure of outstanding credit of rural branches of SCBs. The difference in choice of series might possibly have implication on identification of break dates and its analysis. Earlier studies use the ratio of outstanding credit

to cumulative credit, which might show a different trend behavior as compared to the actual figure of outstanding credit. We find it more appropriate to use the actual figure of outstanding credit of rural branches of SCBs as it captures the volume of flow of credit in rural locations. The ratio may appear to be more appropriate for a sectoral share analysis, which presently is not the focus of our study. Moreover, using absolute values facilitates the estimation of differential in the shifts (of mean and growth rates) over time. The method and estimation procedure is detailed as follows.

3. METHODOLOGY AND DATA

Theoretically, a trend break in a time series data can be established in one of the following ways. First is to identify the break points with prior information of the break date and then validate it using appropriate tests. Such a method is exogenous in nature as the possibility of a break is known a-priory to the researcher. Studies of Kumar (2004) and Burgess and Pande (2005) use such technique. Second, the endogenous method, which relies on the proposition that 'let data speak about itself'. Thus such a method does not use any prior information about a possibility of break(s) at any given point of time and also does not exogenously impose a breakpoint for validation. In this paper we adopt the endogenous approach to identify the trend breaks and further attempt to relate with the policy decision(s) rather than attempting to establish that a particular policy was responsible for the trend break, which may or may not hold true. With the estimation of break dates, we further calculate the growth of the different regimes and analyze their performance.

We use the methodology developed by Bai and Perron (1998, 2003) which allows simultaneous estimation of breaks in trend. The structure of the model is based upon a dynamic programming algorithm which minimizes global sum of squared residuals in an ordinary least square (OLS) regression. The regression model is estimated with (m) possible breaks, or equivalently (m+1) regimes. We employ a trend model of the type, $\ln Y_t = ß_0 + ß_1 t$, where, Y_t is value of outstanding credit of rural branches of SCBs and (t) is time in years from 1969 to 2009. The coefficient ($ß_1$) indicates the rate of growth over time. The estimation allows for a change in both parameters $ß_0$ and $ß_1$ to vary over time and thus results into (m) separate parameters for (m+1) regimes. In particular, a model for estimating trend with (m) regimes can be specified as follow;

$\ln Y_t = ß_{0m+1} + ß_{1m+1}\, t + u_t$, where $t = T_m + 1, \ldots T$ $[T_0 = 0$ and $T_{m+1} = T]$

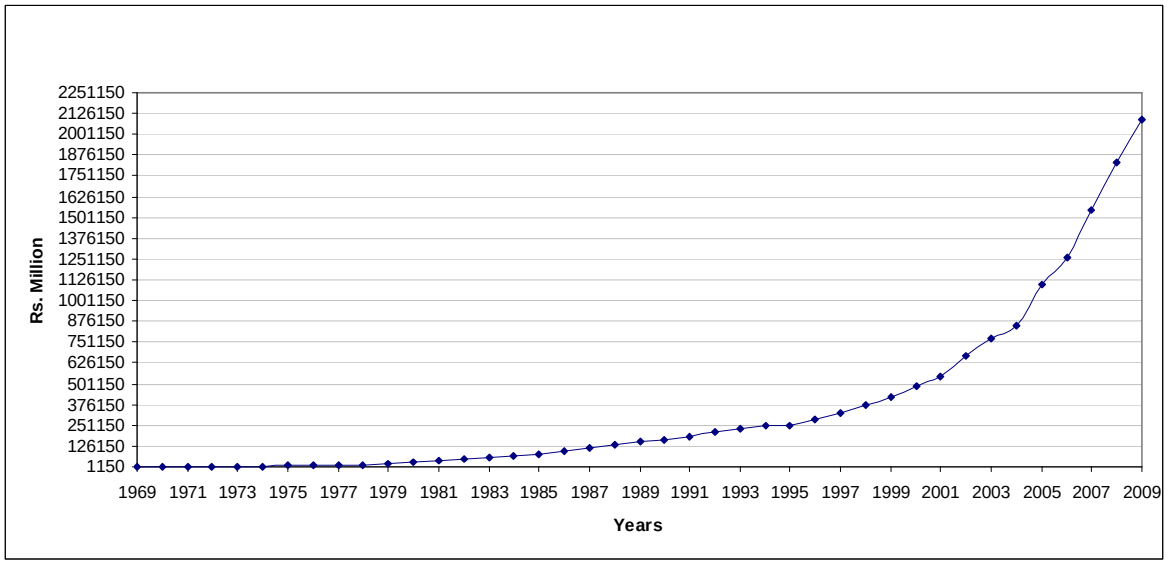
This model as mentioned is a pure structural change model as it allows a break(s) in the level (intercept) and in the slope coefficient. The analysis is to determine the number and location of the breakpoints T_j for j = 1 to m. In computing this, the parameter used is the length of the segment (h) which indicates the minimum number of observation in one segment on which the OLS is computed. This is alternatively expressed as a bandwidth parameter $0 < (\varepsilon) < 1$ which gives (h) as a fraction of the number of observations. Thus if (ε) is 0.15, then for 41 observations, the value of (h) would be 6. This size of segment would then allow upto 5 breaks (or 6 regimes) in the series. Further, the main computational effort is to compute a triangular Residual Sum of Square (RSS) matrix, which gives the residual sum of squares for a segment starting at observation (*j*) and ending at *j'* with $j < j'$. Following the estimation of possible break dates, Bai and Perron (1998, 2003) and Wang (2006) have suggested the use of Bayesian Information Criterion (BIC) to identify the number of trend breaks in case of trending regressors. This is based on the proposition given by Bai (1997) wherein it is demonstrated that stationarity of regressors or disturbances is not required for estimation of break dates. Wang (2006) also shows that the BIC criteria can incorporate trending regressors and is demonstrated to be superior in selecting break dates under such scheme. Break dates are thus given by the values for which the BIC is at minimum. In this study the minimum length of the segment (h) is taken as (6). This might involve an element of judgment in selecting the length of the segment. However it may be argued that six years (and above) should serve as a sufficient time to analyze the trend behavior of the variable. The choice of a smaller segment, though statistically valid, might not adequately capture the variation and may not be plausible for analyzing long term structural shifts. As the study comprises of 41 data points, a value of (h=6) allows a maximum of five break points and six possible regimes.

We also iterate this process by taking values of (h) from 6 to 9 to take into account the variation in break dates as estimated by the model. We finally report break dates when (h)=6 as acceptable break dates, as the same break dates were invariant with the value of $h \in (6,9)$. This fulfills the criteria that (h) is selected such that it is a minimum value which is both statistically meaningful and significant[3]. Following break dates, different intercepts and trend coefficients are reported which correspond observed regimes. Estimation is done using the computational algorithm developed by Zeileis *et al* (2002). As our primary focus is on the

underlying trend and rate of growth, a structural break(s) in the series supports the proposition that flow of credit has not remained constant over time and that indicates why different growth phases are observed.

The data used in the study is the credit outstanding of rural branches of SCBs. The frequency of the data is yearly and is collected for the period of forty one years starting from 1969, the year of first phase of bank nationalization till 2009. The data source is EPWRF (2004) for data upto 2002 and various volumes of *Banking Statistics: Basic Statistical Returns* published by Reserve Bank of India (RBI) for rest of the years. In Figure 1, we graph the amount of outstanding credit of rural branches of SCBs from the year 1969 to 2009. A closer look at the graph shows a slow down in outstanding credit during early nineties. Also a sharp increase in credit outstanding is visible from the graph during first half of 2000s.

Figure 1: Outstanding credit of rural branches of SCBs (amount in INR million)



Source: EPWRF(2004) and Banking Statistics: Basic Statistical Returns, RBI

4. RESULTS AND THEIR IMPLICATIONS

With use of the endogenous model and the estimation following Zeileis *et al* (2002), estimates of break dates come to *1981, 1989 and 1999*. Among all possibilities of (m) break dates, given the value of (h=6) the BIC value is minimum for (m)=3 corresponding to years 1981, 1989 and 1999. These dates reflect to the financial year ending period of 1980-81,

1988-89 and 1989-90. A 97.5 per cent confidence interval around 1981 ranges from 1980 to 1982, for 1989, the interval is 1988 to 1990, while for the year 1999 the range is 1998 to 2000. The differential in the estimates of intercept and trend coefficient can be noted as in Table-1.

Table1: Growth rate of outstanding credit of rural branches of SCBs

Year (Regimes)	Intercept	Trend coefficient	Growth rate (%)[#]
1969 - 1981	6.760	0.285*	32.97
1982 - 1989	8.240	0.177*	19.36
1990 - 1999	9.798	0.100*	10.52
2000 - 2009	7.729	0.166*	18.06

[#] Compound Annual Growth Rate (CAGR)[4].
*Value significant at 1 percent level

It may be noted from the growth rates figures that growth had shown a deceleration from 33 per cent during the regime of 1969–81 to 19 per cent during 1982 – 89. It further decelerated to nearly 11 per cent during 1990 – 99 while it has shown improvement to about 18 per cent in the last regime.

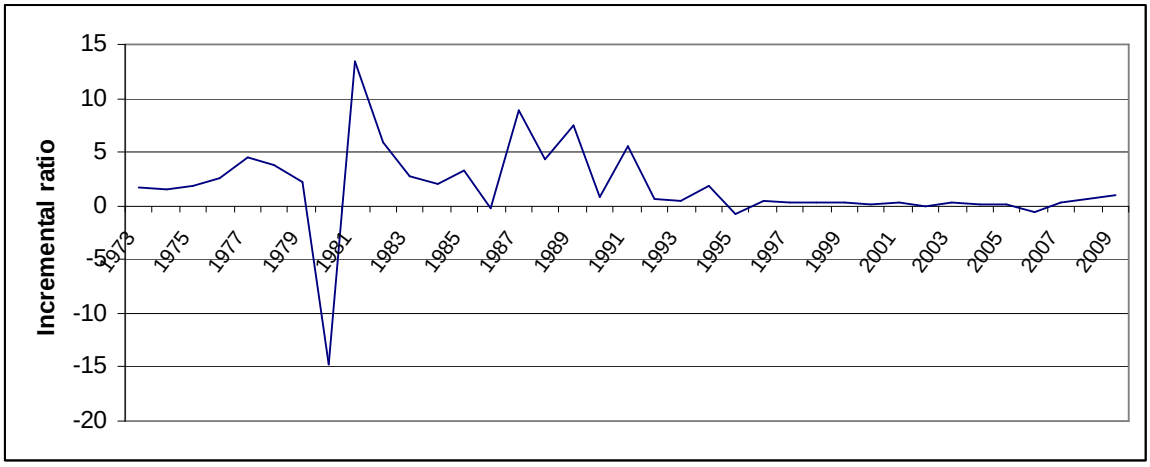
The first break point found in our study may not be coinciding with break dates, 1977 and 1990 as predicted by Burgess and Pande (2005) but remains fairly close to them even though slightly different time series are used. The second break date estimated by us (i.e.1989) and by Burgess and Pande (i.e. 1990) are not common but falls within the same interval [1988, 1990]. Similarly the break date of 1991 observed by Kumar (2005) does not fall within the above interval but remains very close to our estimation. Hence, regarding the second trend break the outcome of endogenous and exogenous method lie within a narrow interval. While, we observe a third break date in 1999, the exogenous method of the earlier studies did not allow them to simultaneously estimate multiple break dates. Also that their purpose was to examine the possibility of breaks around 1977 and 1990 as period marked by the introduction and withdrawal of 1:4 branch licensing policy. Thus, the endogenous method employed here for simultaneous estimation of break dates draws its superiority over the exogenous one.

In the next step we attempt to find the possible explanations which might have led to trend breaks in 1981, 1989 and 1999 as well as varying growth rate in four regimes. The high growth rate in the first regime may be primarily attributed to the low base during pre nationalization period. By 1969 outstanding credit of rural branches of SCBs were only INR

1150 million, which reached to INR 36000 million by 1981 (EPWRF, 2004). Thus results into a CAGR of around 33 per cent in the first regime. The reasons for bank nationalization was to provide banking services in previously unbanked or under-banked rural areas, ensure substantial credit to specific activities including agriculture, and bring certain disadvantaged groups under the ambit of formal credit source. The number of rural branches of SCBs increased to 19453 in 1981 from that of 1443 in 1969 (EPWRF, 2004). The observed phenomenal growth may also be related to green revolution in late sixties from when Government thrust was there to channelize credit through formal sources to agricultural sector as the country then was striving to gain self sufficiency in food grain. Thus, we observe that during the first regime, role of increasing network of rural branch of SCBs to augment growth of credit in rural areas remained at the center.

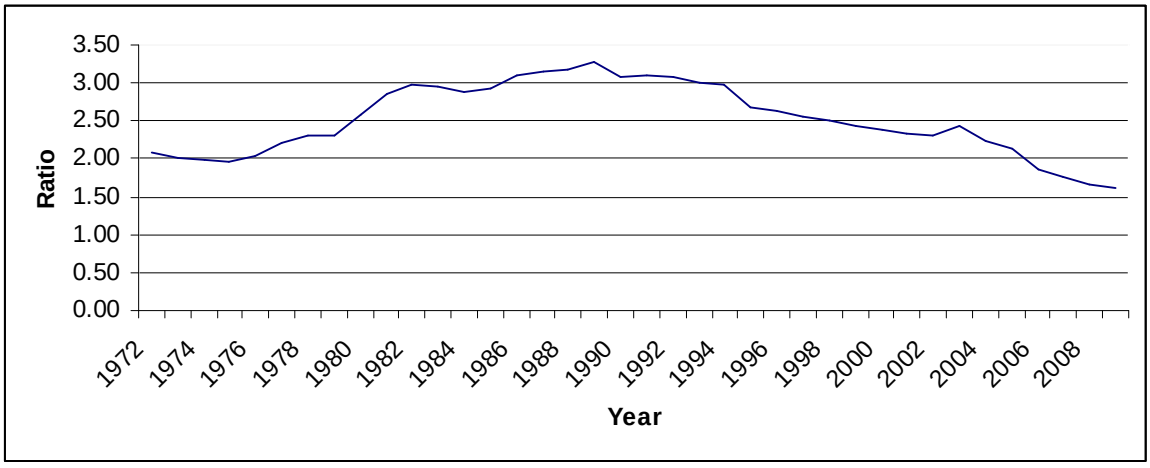
Considering the estimated break dates, we observe that both first and second break dates estimated by us closely coincide with launch and withdrawal of 1:4 branch licensing policy. However the first break date is more close to the year, 1980, when IRDP[5] was extended pan India. Without entering into the debate of identifying a particular policy, the point which needs emphasis and policy attention is the importance of a delivery window to reach the unreached. Figure-2 highlights that from 1977 to 1991, with the exception in very few years, the incremental ratio[7] of rural plus semi-urban branches to urban plus metropolitan branches stayed at around or, even above the prescribed limit of 1:4 (EPWRF, 2004). Negative values of ratio during 1980 and 1986 are due to net reduction in urban plus metropolitan branches, while for 1995 and 2006 it corresponds to net reduction in rural plus semi-urban branches. The incremental ratio dropped in 1992 and went above 1 only once (to 1.9 in 1994) during the eighteen-year period from 1993 to 2009. This may be attributed to the government's acceptance of recommendation of Narasimham Committee (RBI, 1991) which advocated that further branch expansion to be based on "need, business potential and financial viability of location" and consequently the withdrawal of 1:4 branch licensing policy. Following this, number of rural branches remained almost stagnant at around 35300 for consecutive three years (i.e., 1992 to 1994). Rural branch network from its peak at 35396 in 1994 witnessed a sudden decrease of 2379 rural branches, bringing down the aggregate figure to 33017 in the very next year (EPWRF, 2004). This is visible in Figure-3 which shows that after 1994 there is a declining trend in the ratio of rural plus semi urban branches to urban plus metropolitan branches of SCBs, with exception during 2003.

Figure 2: Incremental ratio of rural plus semi urban branches to urban plus metropolitan branches



Source: EPWRF(2004) and Banking Statistics: Basic Statistical Returns, RBI

Figure 3: Ratio of rural plus semi urban branches to urban plus metropolitan branches



Source: EPWRF(2004) and Banking Statistics: Basic Statistical Returns, RBI

From Table-1 we note that growth in outstanding credit of rural branches of SCBs had shown a deceleration from 19 per cent during 1982 – 89 to 10 per cent during 1990 – 99, which improved to 18 per cent in the last regime. Here, we explore the reasons behind trend reversals in rural credit in 1989 as well as 1999. The regime of 1990 to 1999 can be characterized as a period of closure of rural branches (as discussed in earlier paragraphs) accompanied by low growth in agriculture credit. Table-2 shows that between 1990 and 1999 advance of SCBs to agriculture and allied sector grew only at 8.6 per cent but picked up in next regime and experienced a CAGR of 22 per cent during 2000s. Credit to agriculture and allied activity is broadly classified in two categories, 'direct finance' and 'indirect finance'.

First category includes short term (i.e., seasonal) production credit and investment credit advanced directly to farmers for agricultural purposes. Under the second category formal financial agencies lend to institutions which support the agriculture activity. Such institutions include dealers of seed, fertilizer, pesticide, irrigation equipments, farm machinery and feeds, agriculture storage units, food processing and agro based industries, Non Banking Financial Companies (NBFCs) and Microfinance Institutions (MFI) which borrow for on lending to agriculture, to name a few. Table-2 indicates that revival of credit to agriculture and allied activities after 2000 is primarily attributed to significantly higher growth rate in 'indirect finance'. Between 2000 and 2009 'indirect finance' recorded a CAGR of 23.3 per cent as against only 3.0 per cent during the previous regime. This sharp growth in agriculture credit and in particular indirect finance[4] has contributed towards upward trend reversal in rural credit. This may have resulted from continuous thrust from government for meeting priority sector target (40 per cent of net bank credit) and particularly target of agricultural lending (18 per cent of net bank credit) during 2000s, i.e. last regime in our study..

Table 2: Rate of growth of credit outstanding from rural branches of SCBs to agriculture and allied activities (1990-2009, in % per annum)

	1990-1999	2000-09
Growth rate of credit outstanding to:		
Agriculture and allied activities	8.6	22.0
Direct finance	9.0	21.9
Indirect finance	3.0	23.3

Source: Banking Statistics: Basic Statistical Returns, RBI: Mumbai

5. POLICY IMPLICATIONS AND CONCLUSIONS

In our attempt to find structural breaks in the trend of rural credit, we find three possible shifts in the long term trend behavior of the variable. The years 1981, 1989 and 1999 are three time periods where the trend of rural credit shows changes in a significant way. These break dates estimated using the endogenous method are within close range of dates estimated by studies of Kumar (2004) and Burgess and Pande (2005). The break dates also have policy relevance as they indicate the change in behavior and performance of the variable in question. Findings show that in post years of withdrawal of the 1:4 branch licensing policy, there has been a visible decline in the off-take of rural credit, particularly in the period of the 1990s. But 2000 onwards, branch licensing shows a near stagnation and even a minor decline in some years; however off-take in credit has shown an improvement in growth rate. This may

be attributed to the higher growth rate in the indirect finance to agriculture and allied activities as a result of ongoing governmental thrust on meeting the priority sectors lending targets by SCBs.

It has been observed that credit off take in rural areas is very much sensitive to the network of SCBs in rural areas or, stipulation of particular target for lending to agriculture. In the post liberalization period when nationalized Banks were pushed to become competitive against their private and foreign counterparts it might appear to be a duality on the part of the government to compel the nationalized banks to run their rural branches which are nonviable, while the importance of last mile delivery channel can not be ignored. Thus, to ensure timely and adequate credit to the rural population at affordable cost there may be every need of increased involvement of local people having wider knowledge of the local area, economy and people. Government's acceptance of Khan Committee's (RBI, 2005) recommendation of promoting business facilitator and business correspondence, an alternative to rural branch as a last mile delivery channel, who will act as an agent on behalf of bank to reach the banking services to the rural clients, can be viewed as an welcome move in the direction of achieving desired growth in credit off take.

Notes

1. In India Scheduled Commercial Banks (SCBs) are those banks which have been included in the Second Schedule of Reserve Bank of India (RBI) Act, 1934.

2. 'Rural' group includes centers with population 10,000 or, less. 'Urban' group includes centers with population above 10,000 and upto 1,00,000. 'Semi Urban' group includes centers with population above 1,00,000 and upto 10,00,000. 'Metropolitan' group includes centers with population above 10,00,000.

3. We thank Achim Zeileis for his comment on this issue.

4. Compound Annual Growth Rate (CAGR) is calculated using the function: $Ln(Y_t) = \alpha + ßt$, where (Y) is the credit variable and (t) is time. The rate of growth is [{antilog($ß$) – 1} * 100]

5. IRDP was launched in 1978 which was extended to pan India in 1980

6. We take note of the fact that in recent times the definition of 'indirect finance' has been broadened to include various kinds of institutional credit.

7. Incremental ratio is defined as [ΔR+ΔSU] / [ΔU+ΔM] where (R) is number of Rural branches, (SU) is Semi Urban, (U) is Urban, (M) is Metropolitan, and Δ is change between two successive time periods ($P_t – P_{t-1}$) for all variables from t=1970 to 2009.

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