# Financial access of unbanked villages in India from 1951 to 2019: A Spatial Approach

Sandhya Garg
Samarth Gupta

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सत्यमेव परमो धर्मः

# Financial access of unbanked villages in India from 1951 to 2019: A Spatial Approach[1]

## Sandhya Garg[2] and Samarth Gupta[3]

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### Abstract

We develop a novel measure of financial access at the village level by finding the Euclidean distance of unbanked villages to the nearest village or town with bank branch for each year from 1951-2019. We use this measure of financial access to evaluate different bank branch expansion policies over last seven decades. Particularly, we assess how proximity to banks changes in four different regimes of bank branch expansion—pre-Social Banking Phase (1950-1969), Social Banking Phase (1969-1990), Liberalization Period 1 (1990-2005) and Liberalization Period 2 (2005 onwards). We find that social banking policy led to a rapid decline in distance and, thereby, increased financial access. These gains became restricted from 1990 to 2005 as the policy of mandatory quotas on bank branch opening was withdrawn. However, financial access improved again from 2005 onwards when RBI introduced incentive-led policies for bank branch expansion. The results suggest that sound, predictable and incentive driven methods can provide both efficiency and equity of public service provision. The possibility to replicate our measure of financial access in other areas of policy is discussed in conclusion.

**JEL CODES: G21, G28, O25, R12, R15**

**Keywords: Financial Access, Banking, Spatial Distribution, Branch Expansion**

## 1. Introduction

Expansion of banking network in India has undergone drastic changes over the last seven decades. Specifically, banking has seen two major policy shifts—mandatory quotas of social banking period of 1969-1990 and incentive-led bank branch expansion policy of 2005. Some classic and recent studies have analysed the impact of the bank branch expansion on social indicators such as poverty, income inequality, agricultural wages etc. in India[4]. Burgess and Pande (2005) study the social banking period to find how districts which received bank branches observed an increase in consumption and decline in poverty. Young (2017) finds how incentive-led bank branch expansion from 2005 onwards improved several district-level variables such as night-lights and factory productivity. On the contrary, Fulford (2013) shows that increased consumption and reduced poverty in a district due to social banking were only a short-run phenomenon, with opposite effects observed in the long run. Similar views were echoed by Kochar (2011) which uses an improved identification strategy than the one used by Burgess and Pande (2005), to show that the banking expansion benefitted the non-poor, with little significant impact on the poor.

These set of studies have led to the discussion on how access to a financial system in India impacts the economy. However, financial access in these studies so far has been measured at either state or district level. The issue of financial access at the village-level has not received adequate attention. Such a village-level measure of financial access can shed light on how banks affect within-district, inter-village outcome variation.

We contribute to this literature by constructing a novel and more precise measure of bank access at the village level. By using data on commercial bank branches in RBI Commercial Bank Directory, Population Census 2011 and GIS-shape files for boundary of Indian villages as of Population Census 2011, we identify banked and unbanked villages. Then we compute the distance of unbanked village to the nearest banked village/town from 1951 to 2019 which is our measure of village-level financial access. Henceforth, we term this measure as proximity to banks. We will use proximity to banks, proximity to banked villages and proximity interchangeably.

We use our indicator of rural banking access to evaluate different bank branch expansion policies along two different dimensions—pace and coverage of bank branch network. Ideally, any branch expansion policy should meet objectives of facilitating high growth rate of the branch network while ensuring expansion to unbanked or underbanked areas. Through a comparative analysis of different policies of RBI over last seven decades, we can evaluate the effectiveness of each policy along these two dimensions. We find that village-level financial access increased rapidly during the social banking period of 1969 to 1990 as mandatory quotas were introduced to establish rural bank branches. With the withdrawal of these command and control rules after 1990, the bank branch expansion slowed down even though this was a period of high overall

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[4] The debate on banking sector and economic growth is well documented in Levine (2005). For cross-country studies on impact of financial development on poverty, see Beck, Demirguc̣-Kunt, and Levine (2007); Akhter and Daly (2009); Perez-Moreno (2011); Donou-Adonsou and Sylwester (2016); and Rewilak (2017). For impact of banking in other developing countries see Bruhn and Love (2014) for Mexico; Li (2018) for China; Koomson, A Villano, and Hadley (2020) for Ghana. For cross-country studies on relation between financial development and inequality, see Clarke, Xu and Zou (2006) and Mookerjee and Kalipioni (2010). See Kersten et al (2017) for a meta-review of access to finance and performance of Small and Medium Enterprises.

growth in economy. The rate of expansion reverted only after RBI introduced predictability in bank branch expansion guidelines and incentives for expansion from 2005 onwards. The results suggest structured guidelines, and incentives, allowed banks to fully optimise bank branch expansion aided by economic growth. Our results are not only useful for evaluation of different bank branch expansion policies but may also have insights for other areas. For example, telecom industry may also exhibit such trade-offs where establishing a tower in rural or remote areas may create costs for the individual firms.

Our measure of financial access is distinct from the existing methods used in the literature, which are summarized in Table A.1. First, there are studies which have computed geographic and demographic penetration of bank branches where total number of bank branches in an area is either divided by total geographic area or by total population respectively (Burgess and Pande 2005; Alessandrini et al 2010; Beck, Demirguc-Kunt, and Peria 2007, 2008; Zhao and Jones-Evans 2016). Second, in some studies, it is defined as the distance (in kms. or minutes) between the head office of the parent bank and its own branches (Agarwal and Hauswald, 2010). Third, a large number of studies have also used credit to private sector as a ratio of GDP as an indicator of financial access (Rewilak 2017; Clarke, Xu and Zou 2016; Donou-Adonsou and Sylwester 2016). Fourth, studies based on household level surveys have used household distance to the nearest bank branch (Koomson, A. Villano, and Hadley, 2020). Finally, Langford et al. (2020) uses Floating Catchment Area techniques to measure financial access. Particularly, this sophisticated technique accounts for not simply the distance between service provider and service users point but additional geographic characteristics of demand and supply points. The final measure is the distance service users are willing and able to travel for the service. Our measure of financial access provides the proximity for each unbanked village to the nearest banked village/town by using the straight-line distance. This metric has two advantages which make it suitable as a measure for financial access. First, it captures the logistics cost for borrowers of accessing banking services. Second, shorter distance between banked and unbanked villages also has an advantage from the perspective of the bank—being closer to potential borrowers allow the banks to collect and process soft-information used to assess creditworthiness and make lending decisions (Peterson and Rajan, 1994). Further, we construct this distance using administrative datasets, and thus, our measure is not susceptible to biased responses and heaping effects which survey-based methods are prone to (Holbrook et al. 2014).

The paper is organised as follows. Second section provides a detailed description on data construction. Third section describes various RBI's policies on the pace of bank branch expansion. Fourth section analyses the coverage of bank branch network under different time periods. Fifth section concludes.

## 2. Data Construction

We use two main datasets. The first set is the RBI Commercial Bank Directory. It provides the details of each commercial bank branch in the country with the name of the state, district and rural center (roughly equivalent to a village) where the branch is situated. It also provides the year in which each bank branch got established among many other indicators. This data by itself, can provide us the average number of bank branches established in each year over the last seven decades. This gives us the first objective—pace of bank branch expansion. The second data is the GIS shape files which provides us the location of each village in terms of latitude and longitudes of the boundary of each village. This data is obtained from the research team at the World Bank.

These GIS shape files are compatible with Population Census 2011 (henceforth, PC 2011). By merging RBI Commercial Bank Directory with population census and then with GIS data, we compute proximity to banks for each unbanked village. Using the techniques of the spatial mapping, we can assess the spread of bank branch network—our second objective.

We obtain RBI commercial bank directory as on October 31, 2019 which has a total of approximate 1,54,000 bank branches including bank offices. We remove bank offices and obtain the list of 1,48,292 bank branches. All the branches are divided into 4 categories – Rural, Semi-urban, Urban and Metropolitan. The first task was to merge this data with Population Census to uniquely identify the location of villages/towns where each bank branch is present. The RBI directory provides the location of branch in terms of name of state, district and the center. The center is roughly equivalent to the last location of the branch which could be a village, or a town and it matches with respective name of the village/town in the PC 2011. The RBI directory has new names of several districts which were formed post-2011. To begin with, we mapped all the new districts in the census data using the sub-district and village information. For example, we identified the state of Telangana in PC 2011 by identifying districts which were partitioned from Andhra Pradesh to form Telangana. Similarly, new districts were identified by finding the sub-districts units which formed the new districts.

Then, we merged the RBI Bank Directory with PC 2011 using these three common identifiers (state, district, and center). In cases, where there were homonymous villages within a district in PC 2011 data, we needed a fourth common identifier to identify the correct village. The ideal fourth common identifier would be the name of sub-district. But this was unavailable in the RBI Bank Directory. We, therefore, extracted pin code of each bank branch from the *Address* indicator in the RBI directory and used it as a fourth common identifier. Therefore, using these four identifiers, we merged it with census data. Matching on these four indicators gave us an approximate 85% matching rate. For the cases, where merging through this algorithm did not succeed, we matched them manually on a case-by-case basis. It involved identifying the correct village using online resources as well. As of writing this paper, we matched 97.4 per cent of the bank branches with the villages in PC 2011 data. Overall, we could match 1,44,552 bank branches with 45,675 unique villages and towns. The villages which remain un-merged with RBI data are termed as un-banked villages. There were nearly 5.96 lakh unbanked villages as on October 31, 2019.

Merging RBI data with PC 2011 allows us to incorporate spatial data (centroid of each village) in it. This process gives us the GIS location of a village/town where bank branch is situated as per the RBI directory.

Using the above-mentioned data sets, we computed the distance of each un-banked village (as on October 31, 2019) to its nearest banked village/town as a metric of financial access for each year starting from 1951 to 2019[5]. It is measured using the *geonear* user-written command of STATA which identifies the nearest neighbor using geodetic distances (Picard, 2010). Using this

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[5] One concern is that an unbanked village in 2019 was not present in 1951, leading to biased estimate of the bank network. Thus, to be precise, we measure the distance between the *geographic area* of unbanked village in 2019 and banked village from 1951 to 2019. To the extent that these villages were part of some other administrative unit throughout this period, this concern is mitigated. One may overcome this concern if village boundaries from each census from 1951 to 2011 can be mapped. However, such an exercise is beyond our scope.

algorithm, we computed the distance between centroid of un-banked villages in 2019 to the centroid of the banked villages from 1951-2019. Specifically, the 'nearest neighbor' algorithm is first run between un-banked villages (as on October 31, 2019) and banked villages up to year 1951. It will draw the nearest neighbor of each data point in former data (each un-banked village) from the latter data (each banked village). Therefore, for each unbanked village in 2019, we obtain its nearest financial access point in 1951. In the next step, our first data remains the same and second data is replaced with banked villages up to year 1952. This provides the distance between centroid of unbanked villages of 2019 and the centroid of the village nearest to them which had a bank branch in 1952. In this iterative way, we computed the distance of unbanked villages to the nearest banked village in each year from 1951 to 2019. If banking sector has spread over time in the country in terms of opening of new bank branches in un-banked villages, it should show improved proximity for the rest of the un-banked villages i.e. an improvement in the village-level banking access.

We acknowledge some limitations of our metric of financial access. First, our data is derived using the RBI commercial bank directory which provides list of commercial banks only. Therefore, alternative banking service providers such as cooperative banks, SHGs, MFIs, and banking correspondents are not included in our measure as the branch network of these services is not readily available. Second, our measure of financial access does not account for the density of banks in the neighborhood of each village. A village with multiple bank branches in its neighborhood is more likely to have better financial access as compared to a village which has only one bank branch in the neighborhood. We abstract away from this dimension of access. Third, a more accurate measure of financial access would be the distance of each un-banked village from the nearest bank branch. Since, we do not observe the exact GIS location of a bank branch within a village/town, therefore, we cannot compute distance of each unbanked village from its nearest bank branch. Instead, we compute distance of an unbanked village to its nearest village/town with a bank branch. Fourth, driving/walking distance or time to the nearest bank may be a more relevant estimate of financial access. Lack of well-developed transport systems and absence of GIS locations for highway routes pose difficulty in computing this measure. However, several studies have found high degree of correlation between Euclidean distance and driving distance to nearest public good such as health centers in Yemen (Al-Taiar et al., 2010) hospitals in US census tracts (Boscoe, Henry and Zdeb, 2012) and health service providers in Montreal (Apparacio et al., 2008). Few exceptions were found in difficult geographic terrain such as a shoreline, mountainous regions and other physical barriers (Leyshon et al, 2018). Therefore, the concern regarding difference between straight-line distance and time taken to reach the banked village are mitigated to a certain extent. Finally, we do not observe the data on bank branch closures. The RBI directory provides the list of bank branches present as on the latest date. Due to this shortcoming, the distance of an un-banked village from the nearest banked center cannot increase in our data. It will either remain same as previous year or it will decline due to opening of a new bank branch[6].

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[6] It should be added that closure of bank branches is rare and difficult in India. Particularly, if a branch is the sole branch in a center, then its closure is not allowed. More details can be found here:
https://www.rbi.org.in/scripts/NotificationUser.aspx?Id=2503&Mode=0

### 3. Pace of Branch Expansion under Different Policies

In this section, we discuss how pace of bank branch entry varied under different policy regimes for bank branch expansion in India. We divide the period from 1950 to 2019 in four different sub-periods. These are Pre-Social Banking from 1950 to 1969, Social Banking from 1969 to 1990, Post-Liberalization Phase-1 from 1990 to 2005 and finally Liberalization Phase-2 from 2005 onwards. Figure 1 shows the number of bank branches opened in each year since 1950 to 2019. The red bars are number of bank branches in the urban areas and blue bars are for rural areas. The figure shows a clear distinction in the rate of bank branch establishment for different regimes.

**Figure 1: Number of New Branches opened each year in Rural and Urban Areas**
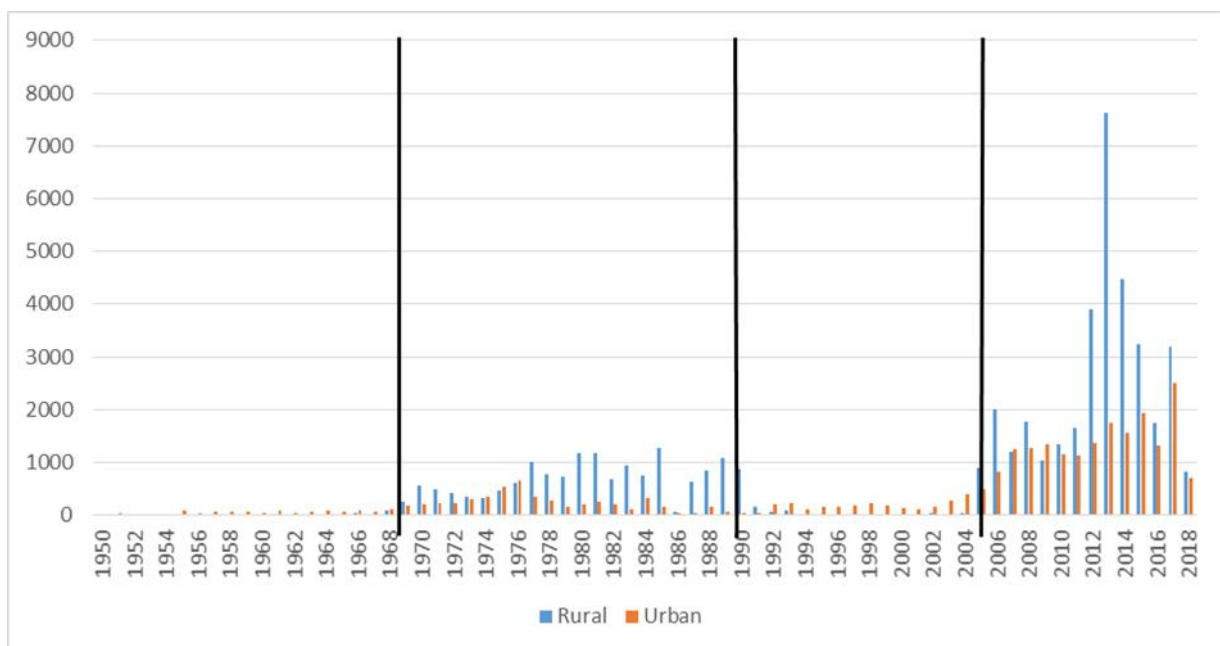


Data Source: RBI Commercial Bank Directory as on October 2019.

Following describes each of these policy regimes.

1. Pre-Social Banking Period (1949-1969): In this period, RBI adopted a demand-following model to guide entry of bank branches. RBI provided licenses to branches in areas with adequate demand for financial services. The reason for this cautious approach was a number of bank closures in the post WW2 period and early years of independence. In 1962, RBI classified all banks into three categories—All India Banks, Large Regional Banks and Small Regional Banks. Banks from each category were allotted their respective geography to open bank branches. RBI set a goal of reaching 10,000 people per branch. To achieve this target, in June 1962, RBI invited 3-year branch expansion plans from banks but provision of licenses remained restricted.

This period was marked by low rate of entry of branches. Further, entry of branches was mostly in urban areas, as shown in Figure 1. The average number of new branches was only 14 per year, whereas the corresponding rate for urban area was 57 (Table 1). This was a period of low economic growth, which may explain low entry of bank branches.

2. Social Banking Period (1969-1990): Nationalization of banks in 1967 ushered in the Social Banking Period of India. RBI devised mandatory location-based quotas for each bank for establishing new branches. Specifically, banks with more than 60% branches in rural areas, had to ensure 2 branch entry in rural areas for every 1 branch established in urban areas. Whereas banks with less than 60% branches in rural areas were supposed to open 3 branches in rural areas for every 1 branch in urban areas (RBI, 1970). RBI revised these quotas at regular intervals. For instance, in 1977, this ratio was increased to 4 branches in rural areas for every 1 branch in urban areas (RBI, 1977).

Motivated by these mandatory quotas, there was a sudden jump in the rate of branch establishment. Further, the network expanded faster in rural areas. Table 1 shows that the average number of new rural branches in this period was 695 per year, whereas for urban areas was 241. The pace of branch establishment in rural areas far outstripped that in urban areas in many years (Figure 1).

Over time, RBI started relaxing the constraints on opening of bank branches. Between 1982 and 1985, banks were allowed to open a branch anywhere in the deficit states where a deficit state was defined as a state with average population per branch greater than national average. Additionally, banks were allowed to open branches in any of the deficit districts of surplus states, where the deficit districts were defined as those where average population per branch was greater than state average. The focus remained on increasing penetration in areas with low presence of bank branches.

3. Post-Liberalization-Period I (1991-2005): Social Banking period ended in 1990 with the beginning of liberalization in India. While the quota-based restrictions on branch entry were withdrawn, RBI did not issue structured guidelines which could create incentives for banks to open more branches. Instead, licenses were granted by RBI on a case-by-case basis; as and when banks submitted its request for an entry, RBI decided to approve establishment of a new branch depending on certain criterion, such as management, the adequacy of its capital structure and earning prospect (RBI, 2005).

The only incentive for banks was the adequacy of demand for banking services in a given area. This implied that branch entry regime reversed to demand-following approach, with most entry in urban areas. As shows in Table 1, rural branch expansion declined to a rate of 95 branches per year, whereas urban areas showed a growth rate of 174 branches per year. Thus, bank branch network reverted to urban areas. Thus, bank branch expansion reverted to urban areas, as opposed to what was observed in the social banking period.

Interestingly, compared to the social banking period, the growth rate in bank branch network in both rural and urban areas was lower in this period. In contrast, GDP growth rate was 5.88% per annum compared to the GDP growth rate of 4.46% per annum in the social banking period from 1969 to 1990[7]. Despite higher growth rate, the pace of bank branch entry was lower even in urban areas. This shows that in the absence of a guiding policy framework, high economic growth rate was not sufficient to facilitate bank branch expansion.

4. Post-Liberalization Period II (2005 onwards): Taking cognizance of low entry of branches and lop-sided growth, RBI devised new rules to influence branch entry. While there were a slew of measures, the main theme across the measures were incentives for opening rural branches and predictability in approval process. Banks were now supposed to submit annual branch expansion plans. Further, to speed up the process of entry, RBI committed to evaluating the plan and responding to banks in 4 weeks from submission of annual branch expansion plans. This was in stark contrast to the period from 1990 to 2005 when each application was approved on a case-by-case basis. Thus, a more predictable environment was created for banks to expand[8].

In 2013, RBI introduced incentives to open bank branches in unbanked centers. RBI demarcated banking markets into 6 tiers, depending on its population as per Population Census 2001. Tier 1 were the metropolitan cities with high level of demand for banking service and Tier 6 were the unbanked rural centers. Banks were supposed to ensure opening of 1 branch in Tier 6 market to obtain 4 licenses for Tier 1 markets. Further, for every branch opened in Tier 2 to Tier 5 markets, banks were given an additional license for a Tier 1 center. RBI also allowed front-loading of branches in unbanked rural center over three years; i.e. if they opened branches in rural unbanked centers over and above the quota described above in a given year, then the excess number of branches would be counted against the target next year.

Predictability in policy framework and incentives for banks were the two guiding principles in this period. Figure 1 shows a sudden expansion of new branches from 2005 onwards. As shown in Table 1, average number of new rural branches was 2,495 per year, whereas the corresponding figure for urban areas was 1,329 per year. Further, additional incentives to open branches in rural areas from 2013 onwards implied high rural bank branch expansion, as demonstrated by a spike in rural bank branch expansion in 2013 (Figure 1).

Although, GDP growth rate was higher in this period compared to the period before, bank branch expansion grew by multiple folds. Further, average number of new branches in rural areas was nearly twice than what was observed in urban areas in this period, indicating not all of it is attributable to higher economic growth. Thus, predictable policy

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[7] Source: https://databank.worldbank.org/source/world-development-indicators#
[8] See Young (2020)

framework allowed banks to take advantage of high economic growth to rapidly expand bank network.

Table 1 summarizes the key points of each policy regime, along with the average rural and urban branch expansion under each regime.

**Table 1: Rate of Branch Establishment in Various Regimes**

| Policy Regime | Description | Average New Branches per Year | | Average GDP Growth Rate (% per annum)* |
|---|---|---|---|---|
| | | **Rural** | **Urban** | |
| Pre-Social Banking (1950-1969) | Demand-following approach; Only centers with adequate demand to have branches | 14 | 57 | 3.90^ |
| Social Banking (1969-1990) | Mandatory Quotas for Rural-Urban Ratio of New Branches | 695 | 241 | 4.46 |
| Post-liberalization Period 1 (1990-2005) | No Mandatory Quotas; Case-by-Case evaluation of bank branch applications | 95 | 174 | 5.88 |
| Post-Liberalization Period 2 (2005-2019) | Approval of Annual Branch Expansion Plans for each bank; Additional licenses in high demand areas a function of branches in unbanked rural centers; Additional incentives for opening branches in underbanked areas. | 2,495 | 1,329 | 6.90 |

**\*Source: World Bank. Link- https://databank.worldbank.org/source/world-development-indicators. # ^GDP growth rate for 1960 to 1968 reported.

## 4. Coverage of Bank Branch Network

The previous section explored how rate of opening of new branches varied under different policies. A policy which expands the network to previously unbanked or underbanked areas holds additional value compared to a regime which creates more concentration in already banked areas. The value arises out of lower transportation costs for households/enterprises and lower soft-information collection costs for banks as lenders. Evidence for the latter has been found in many papers such as Peterson and Rajan (1994) and Ergungor (2010). In this section, therefore, we evaluate the different bank branch expansion policies on the dimension of coverage of the branch network to unbanked areas.

In 2019, there were nearly 5.96 lakh unbanked villages in India. Our measure of coverage of bank branch network is with respect to these unbanked villages. As described in Section 3, we define bank access as the distance to the nearest banked village/town for these unbanked villages. Smaller the distance, higher will be the village's access to banks, and easier would be for the bank to collect soft-information for lending.

Table 2 provides the mean and median proximity to banked villages at the beginning of each policy regime. In figure 2, we plot the average proximity for each year from 1951-2019. Panels A to E of Figure 3 plot the distribution of unbanked villages by proximity for years 1951, 1969, 1990, 2005 and 2019, respectively.

**Table 2:  Proximity of Unbanked Villages to Banked Villages (In kms.)**

|            | Obs     | Mean | Median | Min   | Max   |
|------------|---------|------|--------|-------|-------|
| Up to 1951 | 596,910 | 43.5 | 34.8   | 0.013 | 355.9 |
| Up to 1969 | 596,910 | 21.2 | 17.1   | 0.013 | 294.6 |
| Up to 1990 | 596,910 | 6.5  | 5.2    | 0.004 | 100.8 |
| Up to 2005 | 596,910 | 6.3  | 5.0    | 0.004 | 100.8 |
| Up to 2019 | 596,910 | 4.3  | 3.5    | 0.004 | 100.8 |

Note: (i) We consider un-banked villages as on Oct, 2019 for comparison. (ii) Data Source: Computed by authors using following data sets: (a) RBI Commercial Bank Directory as on Oct, 2019. (b) Population census 2011. (c) Spatial Database for South Asia - World Bank.

In 1951, the average distance to unbanked village was 43.5 km. It declines steeply from 1951 to 1969 with the average distance falling to 21.2 km, and the median distance declining to 17.1 km. The coverage of the bank branch network remained restricted. As seen in Figure 3, the modal distance to the nearest banked village was more than 50 km. Panel B of Figure 3 shows that at the end of this period in 1969, some mass in this distribution shifts to the left but the modal distance remains more than 50km.

After 1969, with the advent of social banking period, the average distance to banked villages declines steeply to 6.5km as seen in Figure 2. Thus, the social banking policy met the objective of spreading the bank network. Panel C of Figure 3 shows that the modal distance shifts to 4 km from 50 km.  However, the median distance was 5.2 km, which suggests for nearly 3 lakh villages, the nearest banked village was still more than 5.2 km away.

From 1990 to 2005, the mean distance decreases slightly from 6.5km to 6.3km. As the median distance remains 5km in 2005, nearly 3 lakh villages still find the nearest bank to be more than 5km away. This figure was nearly the same in 1990. Thus, despite higher economic growth, coverage of new branches was mostly limited to already banked centers.

After 2005, RBI introduced additional guidelines for opening bank branches as described in the previous section. It led to an increase in rate of bank branch entry in rural areas. Now, the distance of banked villages to these unbanked villages declines, especially after 2013 when additional incentives were rolled out (Figure 2). In 2019, the average distance falls to 4.3km. Further, the distribution of unbanked villages by proximity shifts further to the left. The median distance now falls from 5km to 3.5km.
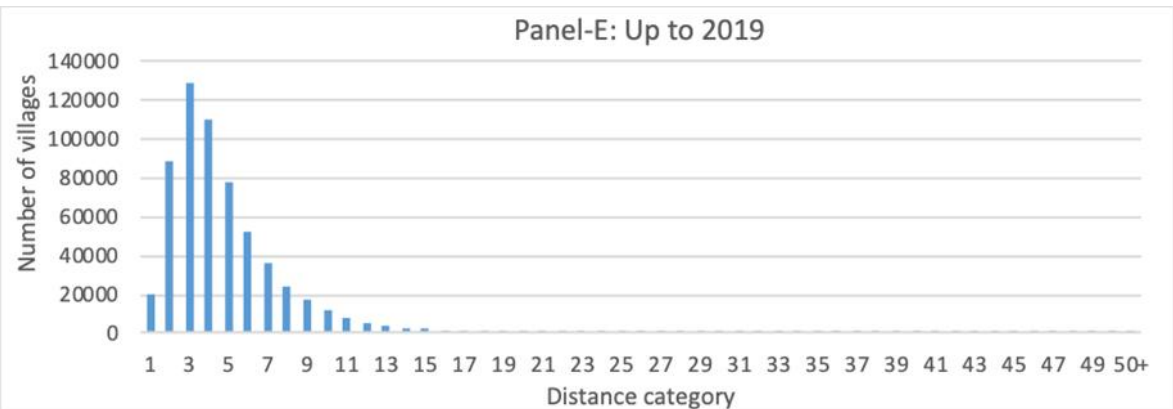
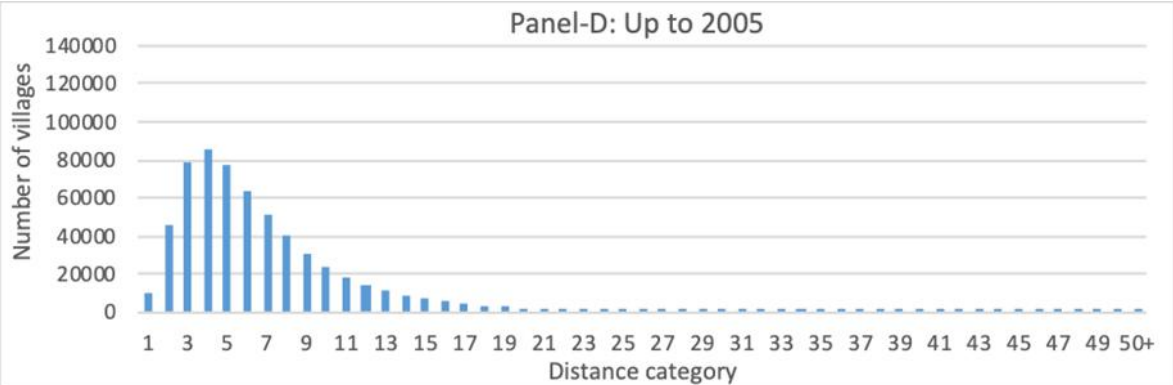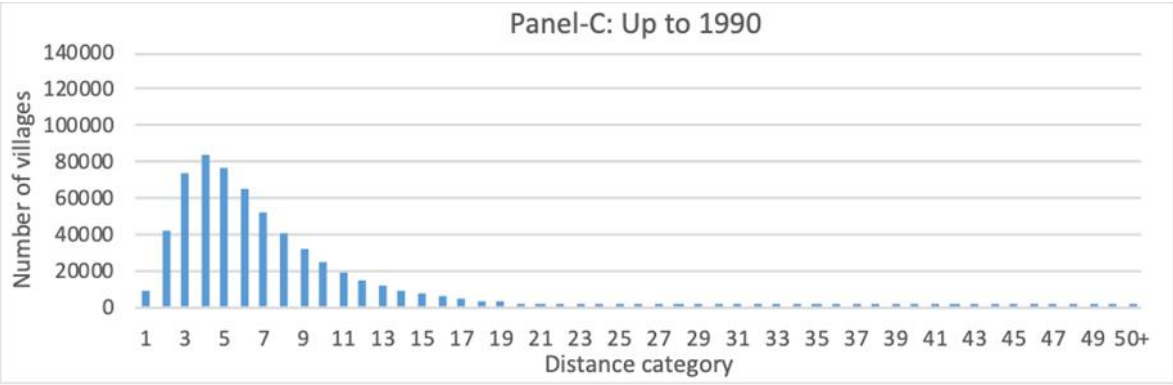**Figure 2: Average distance to nearest village/town with commercial bank: All unbanked villages (1951-2019)**
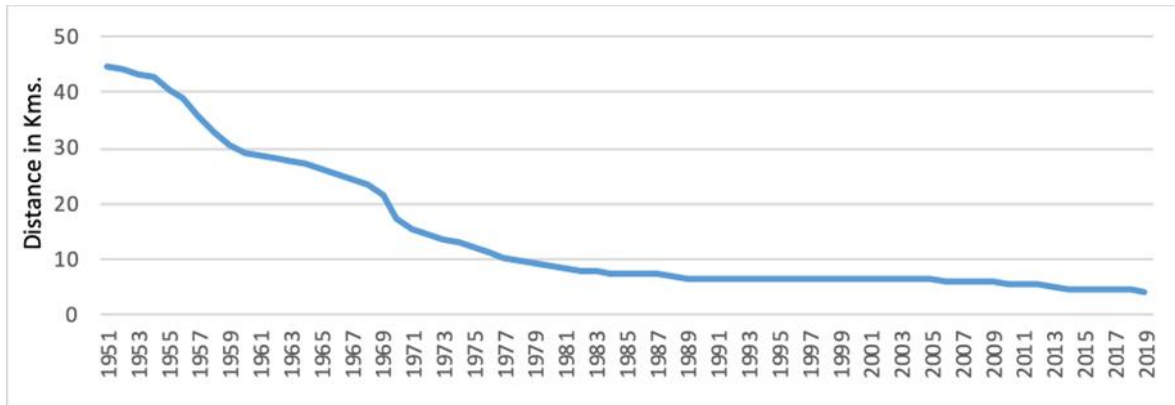


Note: Same as Table 2.

**Figure 3: Distribution of un-banked villages as per their nearest village/town with commercial bank (1951-2019)**

**Panel-C: Up to 1990**



**Panel-D: Up to 2005**



**Panel-E: Up to 2019**
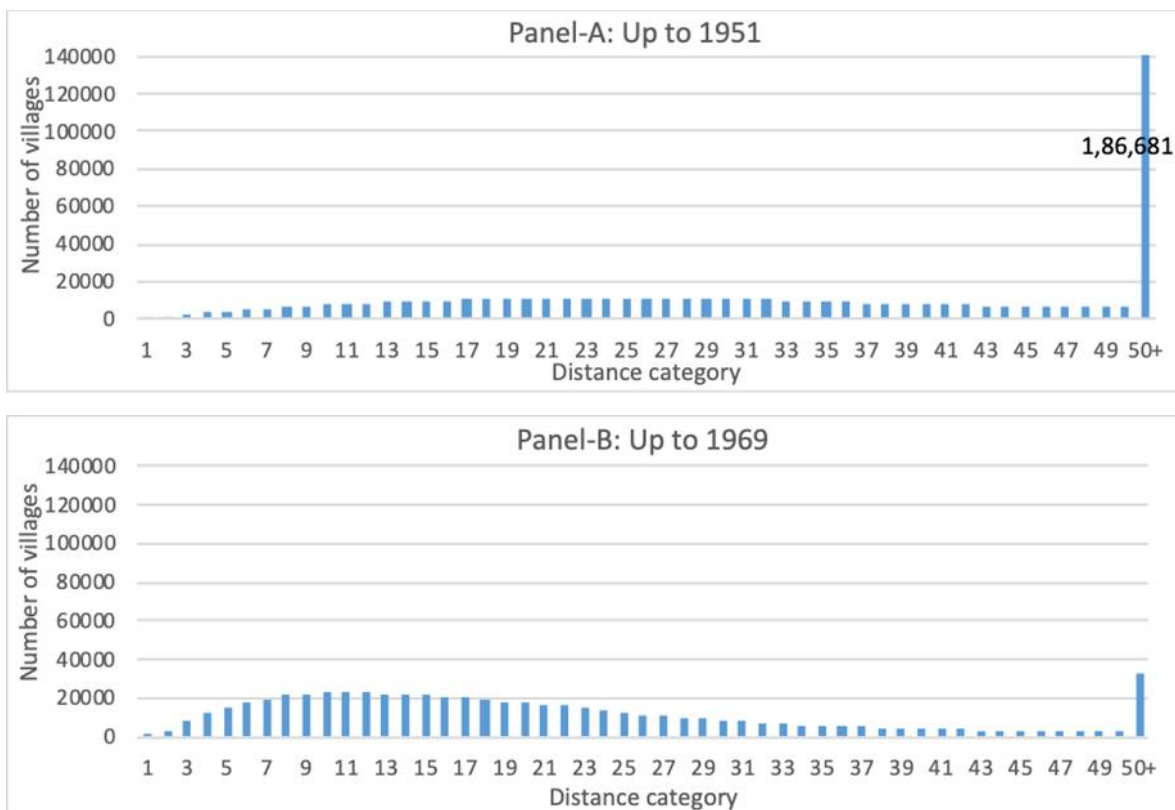
Notes: (i) Based on author's calculations. (ii) All 5 panels are constructed for 596,910 unbanked villages. Although the number of un-banked villages is different in all years, we consider villages un-banked as on Oct, 2019 for comparison. (iii) X-axis explains distance categories where 1 stands for 0-1 km, 2 for 1-2 km and so on. (iv) Each bar shows number of villages (un-banked) which have nearest village/town with bank in the respective distance category. (v) Data Source: As mentioned in Table 2.

In brief, our measure of proximity shows that the rural bank access has improved drastically over the past decades, as the distance of unbanked village to the nearest village or town with bank has declined from 43.5 km in 1951 to 4.3 km in 2019. However, the rate of improvement has been uneven with respect to different periods of banking evolution. The decline in distance to banked villages also indicates that, in rural areas, the distribution of bank branches has not led to the clustering of bank branches in few rural centers, but it has spread in un-banked rural centers as well. Further, this village level indicator of rural banking access can be useful in exploring many other complex issues at the village level. For instance, the impact of improved banking proximity

can be studied on their economic indicators such as poverty; unemployment; firms' or households' access to finance; different degrees of financial inclusion etc.

## 5. Conclusion

In this paper, we showed how different policies of RBI on bank branch expansion have influenced the speed and spread of bank branch network in India.

First, command and control method of social banking period led to a substantial improvement in proximity, indicating expansion of banks in rural arears. However, when mandatory quotas imposed during Social Banking period were withdrawn during liberalization, branch network growth reverted to a low pace of expansion and was mostly growing in urban areas. The first takeaway is that in the absence of structured policy guidelines, high economic growth following liberalization in 1990 was not sufficient to drive bank branch expansion. Bank branch expansion sped up after 2005, when RBI decided to approve annual expansion plans. With the presence of a credible and predictable policy environment, along with additional incentives of setting branches in unbanked and underbanked areas, new branches were established at a much faster rate. Particularly, growth in rural areas outstripped urban branch network growth. This brings us to the second takeaway: sound policies provided the environment for banks to fully utilize the opportunities of high economic growth to expand banking network rapidly.

The underlying lessons for policy makers can be seen through the dimensions of equity and efficiency. High overall economic growth rates were not sufficient for increased efficiency in service expansion of commercial banks. At the same time, command and control methods such as mandatory quotas are not the sole vehicle to create an equitable spread of services or goods. Sound, predictable and incentive-driven methods can provide both efficiency and equity. The insights from this exercise are valid for other industries. For example, ICT connectivity in India is highly skewed with rural teledensity only at 41% compared to urban teledensity at 140%[9]. This could be partly due to lack of adequate number of telecom towers. Currently, telecom towers in remote, rural areas are constructed using funds from Universal Service Fund Obligation. However, as of 2019-20, around 50% of collected funds have remained un-utilized[10]. A well-designed policy which provides adequate incentives for establishing telecom towers in rural areas for private sector may probably generate the same kind of network expansion in telecom towers as seen for banks.

Most papers regarding banking policies have evaluated the effect of bank branch establishment on development indicator outcomes at either state or district-level. However, the impact of bank branch establishment on village-level outcomes requires immense attention as well. The data set we constructed showed that rural bank access has improved drastically as the average distance of unbanked village to the nearest village or town with bank has declined from 43.5 km in 1951 to 4.3 km in 2019. Using this data, many potential questions can be answered: as banks have become accessible to most villages, what impact has this had on village-level economies? Observing outcomes at a more granular, within-district level such as villages, can shed light on new mechanisms, and provide more credible estimates.

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[9] Telecom Regulatory Authority of India (2013). Link:
https://www.unescap.org/sites/default/files/3.5%20IT%20Infrastructure%20Connectivity%20in%20India%20Status%20and%20Way%20Forward.pdf
[10] http://usof.gov.in/usof-cms/usof-fund-status-table.jsp

A methodological contribution of the paper is the use of spatial data, which has largely remained neglected in evaluating policy outcomes. This could be partly due to lack of geographic coordinates of different facilities such as hospitals, and schools. However, the importance of such data sets is well recognized. Use of GIS data at the village level can provide precise estimates of access to public goods and guide a policy planner in several ways. It can identify areas which have excess of some resources and areas with deficiency of those resources and such spatial mapping can be useful for re-allocation. Data requirement issues notwithstanding, our measure of banking access can be easily replicated in other domains of policy such as education, health, telecom etc. For example: Right to Education 2009 directs State government to provide school within a walking distance of 1 km and 3 km of the neighborhood for children in classes I-V and VI-VIII respectively[11]. One can, thus, compute village level distance from the nearest village or town with school using GIS data and District Information System for Education (DISE) data, where list of all types of schools is available along with their year of establishment. Therefore, using spatial data sets along with other village level data can be a useful policy tool and can provide new insights.

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## Table A1: Derivation of banking access in the literature

| Study | Study on | Data | Time | Measures of distance | Definition |
|---|---|---|---|---|---|
| Pietro Alessandrini, A. F. Presbitero, A. Zazzaro, 2010 | Italy | a. Micro-data on Italian manufacturing SMEs.<br>b. Macro-indicators of banking development and organizational structure for the 95 Italian provinces | Three waves of the Survey of Manufacturing Firms (1995-1997, 1998-2000 and 2001-2003) | a. Functional Distance<br>b. Operational Proximity | a. Kilometric distance between the head office of the parent bank and its own branches<br>b. Ratio of the number of bank branches working in a province to the resident population |
| Agarwal and Hauswald, 2010 | USA | 25,746 loan applications of SMEs | Jan 2002 to April 2003 | Distance between the firm, bank branch, and the competitor's bank branch. | Driving distance in miles and minutes. |
| Zhao and Jones-Evans (2016) | UK | a. SME Finance Monitor by BDRC Continental<br>b. Geographical location of all bank branches in UK | Q4 2011 – Q1 2014. | a. Operational Distance<br>b. Functional Distance | a. Total bank branches in each economic region divided by its surface area.<br>b. Average travelling miles between bank branches that are located in same region as that of SMEs and the headquarter of branches. |
| Beck, Demirguc-Kunt, and Peria (2007, 2008) | Cross-country survey which includes, financially and economically developed economies, and emerging markets and transition economies. | a. Survey of bank regulatory agencies conducted<br>b. Publically available data | 2003-04 | Bank outreach defined as:<br>a. Geographic bank penetration<br>b. Demographic bank penetration<br>Similarly ATM penetration was computed. | a. Number of bank branches per 1,000 km²<br>b. Number of bank branches per 100,000 |
| Rewilak, J (2017) | Developing countries | Sample of developing countries over 2004-2015 | Cross section data created by averaging data from 2004-15 | a. Financial depth<br>b. Financial access | a. Credit to private sector as a ratio of GDP; and Ratio of broad money to GDP<br>b. Number of ATMs per 1000 km²; number of bank branches per 1000 km² |
| Clarke, Xu and Zou (2006) | Sample of 83 developing and developed countries | Various sources | 1960 - 1995 | Indicator of financial development | Credit to private sector by financial intermediaries as ratio of GDP |
| Beck, Demirguc̦-Kunt, and Levine (2007) | Sample of 52 developing and developed countries | Various sources | Averaged over 1960-1999 | Indicator of financial development | Credit to private sector by financial intermediaries as ratio of GDP |
| Donou-Adonsou and Sylwester (2016) | Panel of 71 developing countries | a. Data on banking sector from Beck et al. (2013)<br>b. Microfinance data from MFI Profiles and Reports from MIX | 2002-2011 | Indicator of financial development | a. Ratio of credit to private sector to GDP<br>b. Asset to GDP ratio, which also includes credit to public sector |

| Study | Study on | Data | Time | Measures of distance | Definition |
|---|---|---|---|---|---|
| Burgess and Pande (2005) | 16 Indian states | Various sources | 1961-2000 | Bank branch expansion | Per-capita cumulative branch opening in rural unbanked location |
| Koomson, A. Villano, and Hadley (2020) | Ghana | Ghana Living Standard Survey 2016/17 | 2016/17 | Financial Inclusion Index | a. FI Index using: ownership of mobile money account; ownership of a formal bank account; ownership of an insurance policy; access to credit; and receipt of remittances.<br>b. Household distance to nearest bank |
| Langford, M., G. Higgs, and S. Jones (2020) | Wales | Retail bank branches, Ordnance Survey 2018. | 2019 | Access to banking services | Floating Catchment Area Technique |

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**INSTITUTE OF ECONOMIC GROWTH**

University Enclave, University of Delhi
(North Campus) Delhi 110007, India
Tel: 27667288/365/424
Email: system@iegindia.org