On the Allocation of Public Goods to Villages in India[1]

Abstract

We analyse the effect of religious composition on the provision of public services captured mainly by infrastructure index, of four types, (i) basic amenities and amenities such as water housing and sanitation (ii) education (iii) health and (iv) development factors, from a sample of over 1700 villages from a survey done in 1993 in 16 major states of India. We find that mixed villages in terms of religious composition have a higher composite infrastructure index in contrast to the more homogeneous ones. Mixed villages seem to have significantly higher levels of basic infrastructure and amenities, which are demanded, by all sections of the population. Results are not so strong for other indices such as education and health, which may be demanded by sub sections of the population. We do not find evidences of differences in taste for public goods between different religious communities, and major economic factors such as per capita income and population can explain much of the differences in public goods profile across villages.

[1] This work is the outcome of a research project funded by the Ratan Tata Fellowship at the London School of Economics. I am grateful to Prof. Abusaleh Shariff of NCAER, New Delhi, India for providing me with the survey data, and to P.K.Ghosh for clarifications on the same. Discussions with Roli Asthana, Athar Hussain, Meghnad Desai and Maitreesh Ghatak helped immensely. I will also like to thank Peter Wright for assistance with the GIS package and Joanne Hay and Rita Field for administrative asssistance.

Introduction

The links between availability of infrastructure facilities and community composition have been of much interest in the public economics[1] and political economy literature. In the context of provision of local public goods, Tiebout (1955) argues that in an environment with costless mobility, individuals would choose to reside in the jurisdictions that best meets their tax liabilities and the package of public goods provided. An outcome in this case would be one where we will observe homogeneous communities. However in the context of a situation where production of goods requires people with different skills, Berglas (1976) arrived at a solution where the optimum would imply that we have mixed instead of homogeneous communities. Alesina, Baqir and Easterly (1999) conclude from U.S. metropolitan data that more ethnically diverse regions have less shares of public spending. They attribute this result to the fact that different ethnic groups have different preferences on what public money should be spent, the more the ethnic diversity, the less is the agreement on public spending, the less is the tax collected for public good provision. This paper makes an attempt to investigate whether homogeneous or mixed communities in terms of religious composition have a better profile of different types of public services as measured by the infrastructure index from a sample of over 1500 villages in India.

In the Indian context, Betancourt and Gleason (2000) from a district level analysis in India on the allocation of education and health facilities, found evidence of systematic discrimination to regions inhabited by the under-privileged, namely the Muslims and the Scheduled Castes. Foster and Resensweig (2001), from a twenty year panel data of about 250 Indian villages, find that traditional governance is biased towards landed households. Landed households prefer irrigation projects to road construction, while the reverse is true with the landless since the former generates more jobs. (Duflo and Chattopadhyay 2001) study the impact of reservations for women at village level in the State of West Bengal in India. Comparing allocation of expenditures in under the leadership of men and women, they find that women spend more on infrastructure concerned with women's needs such as fuel water and roads, while villages under men invest more in education. In the context of India's democratic structure, Besley and Burgess (2002) find that an active media with a high newspaper circulation makes accountability greater and the government more responsive, especially in dealing in crisis situations crop flood damage or drought in India.

Most studies in the recent past even in the context of growth (Easterly and Levine, 1997) show that more fragmented or mixed communities perform worse than the more homogeneous ones. However, if one were to look at the most prosperous cities, which have allowed free inflow of labour in response to rising economic opportunities, tend to be mutli-cultural, multi-ethnic and multi-religious. If one were to investigate such cases, we might find that rising economic opportunities, give rise to better public services and in turn leads to inflows of people with various skills resulting in mixed communities. Although such explanations may be feasible if we were to analyse urban data, it may not explain religious diversity and public service provision in villages in India where migration will be costly especially for the landed gentry, and economic opportunities in general are restricted to harvesting and sowing times.

[1] See Atkinson and Stiglitz (1980) Lectures on Public Economics, Chapter 17, for a survey.

We have a unique data set of about 1760 villages from 16 major states in India with detailed information of the availability of public infrastructure in these villages, from water supply, sanitation, lighting which will be in demand by all sections and all communities to those like education and health over which people of different groups may have different taste profiles. Given this data set, we would like to investigate the relationship between the various infrastructure indices with the demographic profile, namely whether villages with more homogeneous population composition in terms of religious groups have better or worse indices than the more homogeneous ones. Although religious diversity is not the only variable by which people may be different in Indian villages, there are more subtle differences according to which village population may be grouped, religious classification is a broad way by which Indian villages may be grouped. One will not be very wrong in doing it, given that there is evidence that different religious groups largely specialise in different occupations and therefore may have different tastes over different public goods[2]. Recent literature in India in the context of ethnic conflict (see Varshney 2002) report that whenever interaction between different communities were high enough, cities have remained peaceful, in cases associational life between communities were missing, the tendencies for riots to erupt was much more frequent.

Our results seem to indicate that the more mixed villages in terms of religious composition have a better composite infrastructure index than the more homogeneous ones. More so for village infrastructure and amenities which includes services such as water supply, sanitation and lighting, which may be all expected to be demanded by all sections of society, mixed villages again perform much better. Results are however not so conclusive for other indices such as education, health and development factors. Therefore even if there exists differences in tastes across public goods between religious communities, mixed villages seem to be able to lobby better for public goods demanded by all, and in general have a better mix of public goods. This is in sharp contrast to evidence from U.S. and Africa where population heterogeneity has been found to be of detriment to the provision of public goods and growth.

This paper is organised as follows. The next section outlines the general profile of the villages surveyed, section III discusses the inter-state and intra district disparities across infrastructure indices. Section IV discusses demographic profile and relative inequality in infrastructure indices within villages in a district. Section V presents results on sensitivity of different infrastructure indices in villages to the religious fractionalisation index. Section VI discusses sensitivity of infrastructure indices to religious identity. Section VII concludes.

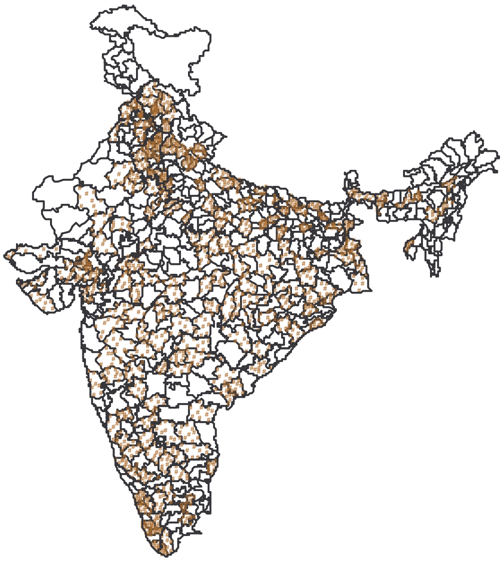
II. Profile of Villages surveyed

We use the National Council of Applied Economic Research (NCAER, Delhi, India) UNDP survey data of 1993. This was spread over 1765 villages over 16 major states

[2] See Barbara Harriss White 2003, India Working, essay on India’s religious pluralism and its implications for the economy.

(see Appendix 1 for the list of states chosen in the survey) in India and interviewed over 32,000 households. The regions that were surveyed is shown in figure 1.

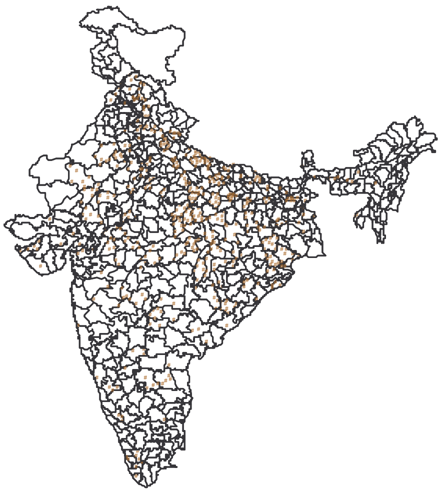
Figure 1: Villages surveyed are indicated by dots.



Note: Villages are marked in the district they are from and may not be at the exact geographical location within the district.

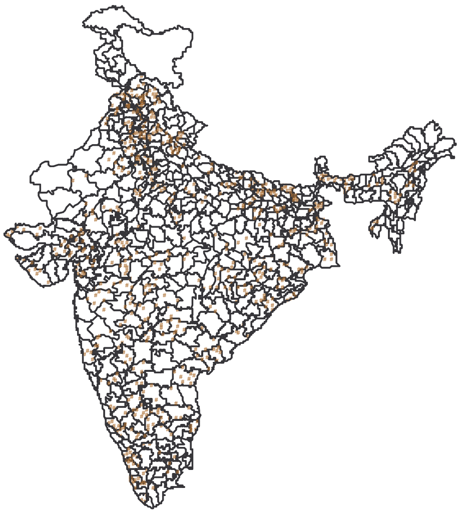
We use data on village infrastructure indices and the demographic profile of the households surveyed. We have data on four different types of infrastructure indices namely in village infrastructure and amenities (VIA), education index (EL), health index (HF) and development indicators (DF). VIA comprises of variables such as accessibility of the village in terms of approach road, bus stop or a railway station, communication facilities as post office and telephone, economic establishment such as bank or a market and basic necessities and amenities such as drinking water source and distance, pharmacy and street lighting. EL captures accessibility of educational institutions, male female student ratio in primary schools, presence of special schemes like mid-day meals, scholarships. HF captures if a hospital, or a sub-centre is within the village itself or further and the availability of a dispensary and a trained doctor or a trained helper. DF captures various other aspects such as proportion of irrigated area to cropped area and government/ngo schemes of development in the village. Scores are assigned to each of these categories depending on their relative importance. A composite village index (CVI) is calculated for each village, by adding up the total score of a village on these four infrastructure indices/ divided by the maximum total score possible and this is multiplied by 100 for normalization. Villages with a CVI less than 31 have been classified as less developed villages, those with a CVI between 31 and 46 were classified as moderately developed villages, and those with an index 46 and above were classified as developed villages. Of the total 1762 villages in the survey, 27% of the villages were less developed, 39% moderately developed and 34% were developed. Figures 2, 3 and 4, gives the spread of the less developed, moderately developed and the developed villages. We see from Figure 2, that the concentration of less developed villages is in the northern states of Bihar, Uttar Pradesh and Madhya Pradesh, moderately developed villages seem to be scattered throughout, and developed villages seem to be concentrated in the states of Punjab, Haryana and Kerela.

Figure 2: Spread of Less Developed Villages in the survey



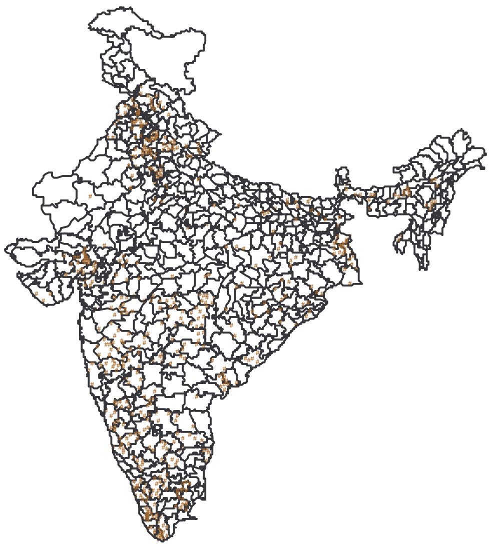
Note: Villages are marked in the district they are from and may not be at the exact geographical location within the district.

Figure 2: Spread of Moderately Developed Villages in the survey



Note: Villages are marked in the district they are from and may not be at the exact geographical location within the district.

Figure 3: Spread of Developed Villages in the survey



Note: Villages are marked in the district they are from and may not be at the exact geographical location within the district.

To capture religious heterogeneity in the village, we use six separate religious denominations as reported by NCAER survey namely (i) Scheduled Tribes (ii) Scheduled Castes (iii) Other Hindus (iv) Muslims (v) Christians and (vi) Others. Although racial and linguistic diversity is wide when considering India as a whole, a village unit with a population of 10,000 or less is fairly homogeneous with regard to both, because of which these data was not reported in the survey. However, since Hindus as a whole are not homogeneous, they have been subdivided into Scheduled Tribes, Scheduled Castes and Other Hindus on account of the significant economic and cultural differences between these sub-categories.

To compute the proportion of each religious group in the village, we compute the household size times the weight of the household summed over households of the same religious groups in the village, divided by the same sum over households of all religious denominations in the village. We then construct a measure of religious fragmentation index which measures the probability that two randomly drawn people from a village belong to different religious groups. Therefore religious fractionalization index (RFRAG) may be defined as

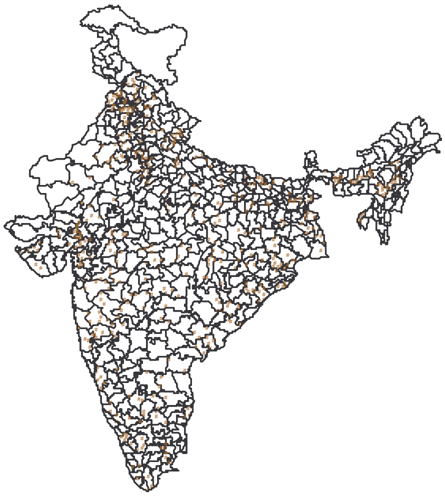
$$\text{RELIGION} = 1 - \Sigma f_i^2$$

Where f_i is the share of population in each religious group in a village.

I = [Scheduled Tribe, Scheduled Caste, Other Hindus, Muslims, Christians, Others]

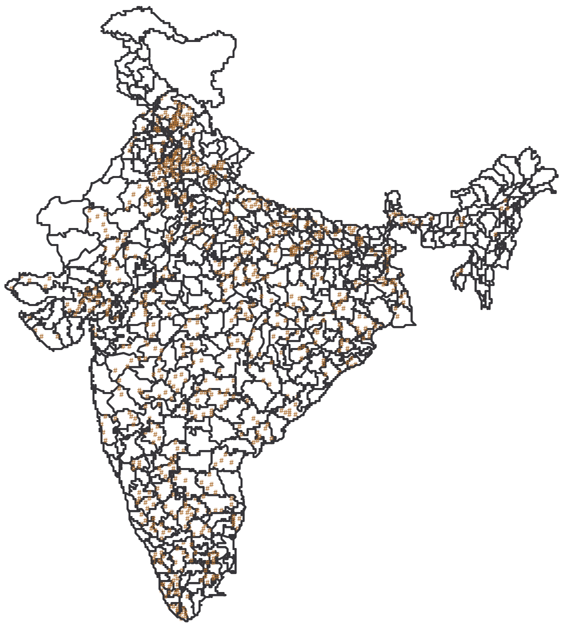
Of the villages surveyed, it is in our interest to know the composition of homogeneous and heterogeneous villages in our sample. In our sample 29% of the villages were homogeneous with a religious fragmentation index less than 0.26, 46% of the villages were moderately heterogeneous with a religious fractionalisation index between 0.26 and 0.52, and 25% of the villages were heterogeneous with a religious fractionalisation index greater than 0.52. Figures 5, 6 and 7 villages in India with low, moderate and high religious fractionalisation index.

Figure 5: Spread of homogeneous villages



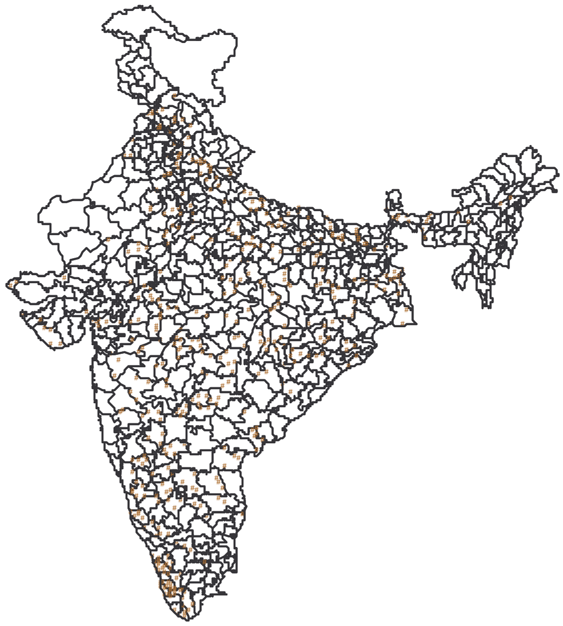
Note: Villages are marked in the district they are from and may not be at the exact geographical location within the district.

Figure 6: Spread of moderately heterogeneous villages



Note: Villages are marked in the district they are from and may not be at the exact geographical location within the district.

Figure 6: Spread of heterogeneous villages



Note: Villages are marked in the district they are from and may not be at the exact geographical location within the district.

From figures 5, we find that homogeneous composition of population is spread throughout the country with a particular concentration in Punjab and Haryana and the Northeast, there is more or less and equal spread of heterogeneous villages as seen from figure 6 and while from figure 7 we find that heterogeneous villages are concentrated in the border villages of the north and Kerela.

III. Inter state and intra-district disparities across indices

We would also like to observe if villages that have a higher CVI have so because they have higher indices on all fronts or if it is the case that villages that are endowed with one facility, may be deprived of some others. Table 1 therefore reports the correlation coefficient between each of the four pairs of infrastructure indices in all villages.

Table 1: Correlation Matrix between different pairs of infrastructure indices

	VIA	EL	HF	DF
VIA	1.0000			
EL	0.4891	1.000		
HF	0.4914	0.3332	1.000	
DF	0.2473	0.1335	0.1330	1.000

Note: This matrix is based on observations from 1758 villages from 16 major states

As we see from the above table the correlation coefficients are highest between village infrastructure amenities, and health facilities, and between village infrastructure and amenities and educations level, and least between development factors and health facilities and development factors and educations level. However, this gives a much aggregated picture and regions that have high infrastructure in the aggregate can be expected to have high infrastructure on all fronts. Whether it is the case that the government concentrates all infrastructural facilities in one village or spreads it out across villages, can be better understood if we analyse the difference in the spread of different infrastructure within each district in each state. Such an analysis will have the advantage of the results not being subjected to the vast differences in demographic and regional characteristics when the country is taken as a whole.

It is in our interest to know that the villages in states that have relatively better human development index have relatively better infrastructure index also. For this reason, we compute the mean[3] composite village index for the villages in each state and rank them. Table 2 shows the rankings of states according to the mean CVI's. The villages in the four northern states Rajasthan, Madhya Pradesh, Bihar and Uttar Pradesh do have the least average CVI compared to the other states. Tamil Nadu, Maharashtra, Haryana and Karnataka seem to have the highest average CVI. Maharashtra comes as a surprise since many of the districts in Maharashtra are very backward, so it may be a problem with the sample selection.

To answer the question if a village's infrastructure compares to the neighbouring villages in the district, we compute the extent of relative deprivation in each village for all the four infrastructure indices and make an aggregate. We then try and find out how each state fares in relative inequality in infrastructure index. To compute the relative inequality within a district, we do it in the same way as a deprivation index is worked out in the HDI. We compute the deprivation index of each village with respect to the four core infrastructure scores, namely VIA, EL, HF and DF. The deprivation indeed for any of these components *x* for each village *i* is defined as

$I_{xi} = (\max X_i – X_i)/(\max X_i – \min X_i)$

Where $\max X_i$ is the maximum of X_i within the villages of the district
And $\min X_i$ is the minimum of X_i within the villages of the district

Where $X_i = \{VIA, EL, HF, DF\}$

The aggregate deprivation index for the village *i* is worked out as the average of the deprivation index in each of the four components, and therefore

$RD_i = ¼(\Sigma X_i)$

The average of this relative deprivation index[4] for every state has been reported in the Table below. This serves as an indicator of the equitable distribution of public resources within a district of the state. Therefore the ideal situation would be done with a high mean CVI and a low average of relative deprivation for any state. We find from the Table 2. That Tamil Nadu does the best on both these counts, so does Haryana. Himachal Pradesh, Rajasthan, Madya Pradesh, Bihar and Orissa perform badly on both

[3] The mean here is a simple arithmetic mean of the CVI's of villages in the states.
[4] This is also calculated as a simple arithmetic average of the relative deprivation in the villages across all districts in the state

these indicators. States that seem to have divergent indices are the North Eastern States, which fare relatively poorly in CVI, but well in the context of relative inequality. Likewise Uttar Pradesh is almost at the bottom in mean CVI but somewhere in the middle with regard to relative inequality within districts. By contrast Karnataka has a high average CVI within its villages, but it is not evenly spread in terms of inequality of it is as low as in the 11th position.

Table 2: Average CVI and average relative deprivation across states.

state names	mean CVI	rank CVI	RD	rank rd
Tamil Nadu	52.7763	1	0.4524	1
Haryana	45.3778	3	0.4816	2
Punjab	44.3429	5	0.4834	3
Gujarat	41.7046	8	0.4909	4
North Eastern States	40.6	10	0.4971	5
Maharashtra	47.649	2	0.4979	6
Uttar Pradesh	30.271	14	0.5009	7
West Bengal	42.8461	7	0.5148	8
Kerala	44.1466	6	0.5212	9
Andhra Pradesh	41.3982	9	0.5234	10
Karnataka	44.6074	4	0.5452	11
Himachal Pradesh	36.8095	11	0.5534	12
Rajasthan	29.934	15	0.5561	13
Madhya Pradesh	29.8618	16	0.5686	14
Bihar	32.5862	13	0.5688	15
Orissa	32.9405	12	0.5712	16

IV. Demographic profile and relative inequality

As far as discrimination by religion is concerned, it would be of interest if the regions where the minority live are more discriminated in terms of infrastructure index. For this reason, the mean CVI[5] was computed for each religious group, by using the proportion of population of its total population residing in any village as its weight. The same weight was used to compute the mean relative deprivation index in terms the four infrastructure indices. It comes as no surprise that the Scheduled Tribes are most deprived, they tend to live in the place with the least infrastructure, and they are also relatively the most deprived, within the villages in their district (see Table 3). Of the religious groups, others which include Janis, Sikhs, Parsees and Buddhists seem to do the best in terms of living in villages with high infrastructure indices. Moreover, they also seem to be living in villages which are better endowed than the neighbouring villages in the district. Of particular interest is that Christians seem to live in places which have better infrastructure index, however the villages in which they live in seem to be more relatively deprived compared to villages in their district. Muslims seem to be

[5] This was computed by taking the arithmetic mean of the CVI's weighted by the proportion of population of the community that lived in each of these villages

residing in areas which have relatively poorer infrastructure, as well as in the relatively poorer villages within the district.

Table 3: Community profiles across infrastructure indices

Religion	mean CVI	rank mean CVI	mean rd	rank mean rd
Scheduled Tribe	40.3474	6	0.4997	6
Scheduled Caste	43.8294	4	0.445	3
Other Hindus	45.0079	3	0.4327	2
Muslims	43.3439	5	0.4462	4
Christians	49.0939	2	0.4718	5
Others	49.0797	1	0.4138	1

Finally we look into the issue if the more mixed villages, which should be having a better mix of infrastructure indices as according to the model, has lower aggregate relative deprivation. Table 4 reports the regression results of aggregate relative deprivation index on religious fractionalisation index with and without controls. We find that in all cases with and without controls, the coefficient of religious fractionalisation index is negative and significant, implying that the more mixed villages have less aggregate relative deprivation than the neighbouring villages in the district. When we include controls such as per capita income and population they have the expected signs and are significant and negative, implying that higher per capita income and higher population[6] villages have a lower aggregate relative deprivation index. The fit of the model improves in model 4 when we include the state dummies and allow for the constant to vary across states, and in model 5, when we allow for both the constant and the coefficient on population to differ across states. Even after allowing for these the main results in the model do not change.

[6] The variable on per capita income was also constructed from household data. The per capita income of the household was weighted with the household size times the weight of the household to get the mean per capita income of the village. The village population was provided along with the data and was compiled from the 1991 census.

Table 4: Dependent variable is Aggregate Relative Deprivation Index

Independent Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Religious fractionalisation index	-0.14075* (<0.0005)	-0.4375* (<0.0005)	-0.10989* (<0.0005)	-0.1079* (< 0.0005)	-0.134* (0.001)	-0.10958* (0.011)
Per capita income		-8.97e-6 (<0.0005)	-8.74e-6 (<0.0005)	-8.27e-06 (<0.0005)	-6.89e-6 (0.0002)	-5.78e-6 (0.009)
Population			-2.26e-5 (<0.0005)	-2.26e-05 (<0.0005)	-2.35e-5 (<0.0005)	
Coefficient of variation				-0.013 (0.409)		
					State dummies included	State and population interaction dummies included
Constant	0.5768 (<0.0005)	0.6200 (<0.0005)	0.6650 (<0.0005)	0.6719 (<0.0005)		
No. of obs.	1758	1758	1670	1670	1670	1670
Adj. R squared	0.0145	0.0244	0.1139	0.112	0.1224	0.1907

Note: The figures in parenthesis indicate the p values of the coefficients

Having seen the effect of aggregate relative deprivation on community composition as captured by the religious fractionalisation index, we now do a similar analysis to see the effect of religious fractionalisation index on different infrastructure indices.

V. Infrastructure indices and religious fractionalisation index

In this section our main interest is on the effect of community composition as captured by religious fractionalisation index on different infrastructure indices, to see whether population heterogeneity leads to more or less infrastructure being provided. For each regression in addition to religious fractionalisation index, we include other control variables. The control variables that have been used are per capita income, population, state dummies, and population and state interaction dummies. We first conduct regressions on Composite Village Index (CVI) which was computed as the sum of the scores in all four indices scaled down by the sum of the maximum of the scores that could be obtained in each of the indices times 100, results of which are reported in Table 5. We find that coefficient of religious fractionalization index remains positive and significant, even after controlling for other factors like per capita income assuming that richer villages have better infrastructure index and for population given that villages with larger population have better amenities. The fifth control that has been included is a state dummy to allow for the constant in each state to vary[7], and in the sixth control we allow for the interaction between the state dummy and the population, that is allow

[7] We find from the increase in R squared that the introduction of state dummies results in a better fit of the model.

for the coefficient of population and the constant to differ across states and even after the inclusion of these controls the coefficient of Religious Fragmentation Index remains significant at the five percent level of significance when we look into the aggregate infrastructure index. This is also in line with the prediction from our theoretical model that the more mixed villages will seem to have a better aggregate infrastructure than the more homogeneous ones given increasing marginal costs of providing infrastructure. Mixed villages seem to have a better mix of all infrastructure indices than the more homogeneous ones and this will be reflected in their higher CVI's. This result may also be due to the fact that, unlike in the U.S where much of the public infrastructure is provided out of locally raised funds, in India much of it is through grants in aid, and more heterogeneous villages in terms of religion are better able to mobilize public resources than the more homogeneous ones.

We now look into the impact of religious fractionalisation on Village Infrastructure and Amenities, an infrastructure that is demanded by all sections of the population. Demand for public services which are usually not privately supplied like water supply, street lighting will be high and primary and will be demanded by all communities and all income profiles, given that they are the basic necessities. We find from Table 6, that coefficient of Religious fractionalisation index remains significant even after adding all controls. Also, given that there is a matching of interests; various interest groups within the population may be campaigning for same public services.

In contrast, if we compare these results with those for the education index and for the health index, we see that the results are not always in conformity like in the case of composite village index and village infrastructure and amenities index. The regressions with regard to Education level index reported in Table 7 show that religious fractionalisation is significant only when the per capita income is added as a control, and when per capita income, population and state dummies are added as a control. A possible reason for this divergence can be, the whole population of the village may not be accessing these services. In particular of the population becomes important here, the very poor and the illiterate may choose not to opt for schooling, and the very rich may opt for more expensive or a better school in a nearby village. Therefore for these public facilities for which an alternative private supply may be available, the lobbying for such services within the village becomes considerably weaker. Results for health index are reported in Table 8, and religious fractionalisation index is significant only without controls and when per capita income is added as a control. Results for development factors index which captures the variables such as the extent of irrigated area, and the number of development schemes in the village is significant only when we have per capita income, population and state dummies as controls.

Table 5: Dependent variable is Composite Village Index

Independent Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Religious fractionalisation index	5.5129* (0.001)	5.8313* (0.000)	3.3213* (0.034)		4.9029* (0.001)	3.4572* (0.011)
Per capita income		0.001 (0.000)	0.0009 (0.000)		0.0003 (0.005)	0.0003 (0.022)
Population			0.0017 (0.000)		0.0014 (0.000)	
Coefficient of variation						
					State dummies included	State and population interaction dummies included
Constant	36.4154 (0.000)	31.8416 (0.000)	28.5213 (0.000)			
No. of obs.	1758	1758	1670		1670	1670
Adj. R squared	0.0057	0.03854	0.1708		0.3669	0.4274

Note: The figures in parenthesis indicate the p values of the coefficients

Table 6: Dependent variable is Village Infrastructure Index

Independent Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Religious fractionalisation index	7.3307 (0.000)	7.6385 (0.000)	5.1626 (0.005)	5.8347 (0.001)	3.8022 (0.021)	5.4372 (0.012)
Per capita income		0.001293 (0.000)	0.0012 (0.000)	0.00014 (0.000)	0.00041 (0.002)	0.0004 (0.015)
Population			0.0019 (0.000)	0.001 (0.000)		0.001 (0.000)
pindex						0.1202 (0.820)
				State dummies included	State and population interaction dummies included	State dummies included
Constant	0.5067 (0.000)	32.2852 (0.000)	30.5437 (0.000)			
No. of obs.	1758	1758	1670	1670	1670	1168
Adj. R squared	0.0073	0.0490	0.1685	0.3306	0.3969	0.2939

Note: The figures in parenthesis indicate the p values of the coefficients

Table 7: Dependent variable is Education Level

Independent Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Religious fractionalisation index	3.6826 (0.07)	4.1665* (0.049)	2.4486 (0.252)	4.223* (0.02)	3.3815 (0.074)	5.2444 (0.027)
Per capita income		0.00088 (0.000)	0.00084 (0.000)	0.0002 (0.192)	0.00014 (0.368)	0.0002 (0.221)
Population			0.0013 (0.000)	0.0011 (0.000)		0.0010 (0.000)
pindex						-0.6611 (0.250)
				State dummies included	State and population interaction dummies included	State dummies included
Constant	40.7826 (0.000)	36.5603 (0.000)	33.6812 (0.000)			
No. of obs.	1758	1758	1670	1670	1670	1168
Adj. R squared	0.0019	0.0172	0.0633	0.3111	0.3304	0.2894

Note: The figures in parenthesis indicate the p values of the coefficients

Table 8: Dependent Variable is Health Facilities Index

Independent Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Religious fractionalisation index	5.4392* (0.029)	5.6324* (0.024)	1.9858 (0.418)	3.7608 (0.118)	2.6779 (0.258)	2.2838 (0.432)
Per capita income		0.00058 (0.002)	0.00058 (0.003)	0.00018 (0.354)	0.00011 (0.568)	0.0001 (0.524)
Population			0.0021 (0.000)	0.00197 (0.000)		0.002 (0.000)
pindex						0.3268 (0.644)
				State dummies included	State and population interaction dummies included	State dummies included
Constant	26.8602 (0.000)	24.0848 (0.000)	20.574 (0.000)			
No. of obs.	1758	1758	1670	1670	1670	1168
Adj. R squared	0.0021	0.0068	0.0978	0.1920	0.2333	0.2108

Note: The figures in parenthesis indicate the p values of the coefficients

Table 9: Dependent Variable is Development Factors Index

Independent Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Religious fractionalisation index	4.54366 (0.128)	4.886329 (0.099)	3.2963 (0.281)	6.5092* (0.016)	4.6604 (0.085)	7.5384 (0.023)
Per capita income		0.0002 (0.000)	0.00129 (0.000)	0.0007 (0.002)	0.0006 (0.005)	0.0006 (0.013)
Population			0.00095 (0.000)	0.0006 (0.001)		0.0005 (0.0001)
pindex						0.6641 (0.82)
				State dummies included	State and population interaction dummies included	State dummies included
Constant	33.1957 (0.000)	28.1439 (0.000)	25.5322 (0.000)			
No. of obs.	1758	1758	1670	1670	1670	1168
Adj. R squared	0.0008	0.00123	0.0307	0.2956	0.3091	0.2938

Note: The figures in parenthesis indicate the p values of the coefficients

It is also to our interest to analyse whether villages with districts which elected a representative of the same party as the one in the central government eventually emerge with a higher infrastructure. Since India has a federal structure, it will also be interesting to see if villages that elected the same representative at the state level legislative assemblies have better infrastructure index. However, it was not possible to match the villages to the assembly constituencies that they come from, but we did try and match the set of the villages to the parliamentary constituencies. Since parliamentary constituency boundaries and political district boundaries usually do not match it was not possible to match all villages to the respective parliamentary constituencies. Since the survey was carried out in 1992-93, we considered results of the past five parliamentary elections, 1991, 1989, 1984, 1980 and 1977. A score of 1 was given to the village if it elected the party which formed the government at the centre, and 0 if it elected one from the opposition. If it elected a party that supported the government from outside, a score of 0.5 was given. Summing up all the scores over the five years and dividing by 5, gives us the proportion of times the village elected a representative of the same party gave us the variable pindex for each village. In model 6, we try to find the effect of the frequency with which a village elects a representative of the incumbent government, pindex on its infrastructure indices, cvi, via, el, hf and df.. We put religious fractionalisation index, per capita income, village population and state dummies as controls. In none of the cases is the coefficient of pindex significant, only in the case of village infrastructure index, health facilities and development factors, it has the expected positive sign, while for education level and composite village index it has a negative sign, but in call cases the coefficients are insignificant. This may be due to the fact that central representatives may not be playing much of a role in village.

VI. Sensitivity of Infrastructure indices and religious identity

In the last section the analysis was done with using community composition using religious fractionalisation index. One weakness of this index is it does not take into account distinctions in religious identity. That is if a village contains only two communities 40 percent Hindus and 60 percent Muslims, it will be expected to have similar infrastructure index as one with 60 percent Hindus and 40 percent Muslims, if other factors such as population and per capita income were the same. To see if religious identity makes a difference to the infrastructure indices we regress each infrastructure index with proportion of population in each group as independent variables with and without controls. Other Hindus however have been left to avoid multi-collinearity and also serve as a reference category for our analysis. In Table 10a, in our regressions without any control we find that proportion of ST's have a negative impact on all indices. A higher proportion of SC's relative to other Hindus also works to the detriment on the composite village index and village infrastructure and amenities, but has a positive impact on development factors index. An increasing proportion of Christians relative to Hindus has a positive significant effect on the composite village index, village infrastructure and amenities, but a negative impact on development factors. Likewise an increase in the proportion of others relative to other Hindus would imply a significant increase in the composite village index, village infrastructure and amenities, education level and development factors. Results remain roughly unchanged if per capita income were included as a control variable (see Table 10b). When we include village population as an additional control variable, the impact of an increase in any of the religious groups relative to the other Hindus does not have an impact any longer on either health or education index except for Scheduled Tribes whose presence still has a negative effect (see Table 10c). If one were to include the effect of regional factors by including state dummies, and allow for population interaction, the fit of the model improves immensely (see Table 10e). A relative increase in ST's to other Hindus has an adverse impact on the provision of all infrastructure services, an increase in the proportion of Christians and Others relative to other Hindus have positive and significant impact on village infrastructure and amenities. It is somewhat surprising that although both SC's and ST's are the depressed classes in India, the presence of ST's has an adverse impact on infrastructure while that of SC's do not in the presence of controls. A possible explanation may be that SC's are more or less spread out in all parts of the country, while ST's reside in geographically remote areas, which are underdeveloped. Presence of ST population in India is mainly concentrated in the North East and in Central India.

Table 10a: Sensitivity of Infrastructure Indices to Population Composition

Infrastructure Indices / Independent Variables	CVI	VIA	EL	HF	DF
Proportion ST	-11.958* (0.000)	-16.316* (0.000)	-4.641* (0.016)	-12.114* (0.000)	-23.928* (0.000)
Proportion SC	-2.796 (0.125)	-4.663* (0.029)	-4.293 (0.073)	-1.559 (0.577)	6.348* (0.048)
Proportion Muslim	-2.895 (0.862)	1.654 (0.551)	-2.440 (0.266)	1.782 (0.487)	-5.015 (0.089)
Proportion Christian	9.240* (0.002)	18.036* (0.000)	7.281 (0.058)	10.582* (0.018)	-26.355* (0.000)
Proportion Others	6.935* (0.001)	7.3269* (0.000)	10.610 (0.000)	-1.654 (0.590)	19.533* ((0.000)
Constant	39.796* (0.000)	45.016 (0.000)	43.114 (0.000)	30.137 (0.000)	36.664 (0.000)
No. of Obs.	1758	1758	1758	1758	1758
Adj. R^2	0.0549	0.0799	0.0174	0.0203	0.0864

Note: The figures in parenthesis indicate the p values of the coefficients

Table 10b: Sensitivity of Infrastructure Indices to Population Composition

Infrastructure Indices / Independent Variables	CVI	VIA	EL	HF	DF
Per capita income	0.0007* (0.000)	0.0009* (0.000)	0.0007* (0.000)	0.0004* (0.000)	0.0008* (0.000)
Proportion ST	-10.490* (0.000)	-14.368* (0.000)	-3.173 (0.103)	-11.352* (0.000)	-22.167* (0.000)
Proportion SC	-1.580 (0.386)	-3.048 (0.152)	-3.077 (0.200)	-0.928 (0.742)	7.808* (0.016)
Proportion Muslim	0.706 (0.672)	2.487 (0.202)	-1.444 (0.511)	2.299 (0.372)	-3.820 (0.197)
Proportion Christian	7.308* (0.012)	15.472* (0.000)	5.349 (0.164)	9.580* (0.034)	-28.674* (0.000)
Proportion Others	6.273* (0.002)	6.449* (0.006)	9.950 (0.000)	-1.997 (0.516)	18.740* ((0.000)
Constant	36.159* (0.000)	40.187 (0.000)	39.477 (0.000)	28.250 (0.000)	32.299* (0.000)
No. of Obs.	1758	1758	1758	1758	1758
Adj. R^2	0.0549	0.0991	0.0174	0.0216	0.0929

Note: The figures in parenthesis indicate the p values of the coefficients

Table 10c: Sensitivity of Infrastructure Indices to Population Composition

Infrastructure Indices / Independent Variables	CVI	VIA	EL	HF	DF
Per capita income	0.0006* (0.000)	0.0008* (0.000)	0.0006* (0.000)	0.0004* (0.053)	0.0011* (0.000)
Population	0.002 (0.000)	0.002* (0.000)	0.001* (0.000)	0.002* (0.000)	0.0008* (0.000)
Proportion ST	-8.481* (0.000)	-12.396* (0.000)	-1.932 (0.329)	-8.076* (0.000)	-20.963* (0.000)
Proportion SC	-1.944 (0.258)	-3.111 (0.122)	-2.897 (0.223)	-2.514 (0.358)	7.983* (0.015)
Proportion Muslim	-0.567 (0.720)	1.302 (0.482)	-2.683 (0.220)	0.723 (0.774)	-4.702 (0.119)
Proportion Christian	6.796* (0.013)	15.764* (0.000)	5.841 (0.121)	7.251 (0.094)	-31.013* (0.000)
Proportion Others	7.602* (0.000)	8.421* (0.000)	11.591 (0.000)	-1.472 (0.618)	18.494* ((0.000)
Constant	31.904* (0.000)	35.536 (0.000)	35.798 (0.000)	23.483 (0.000)	29.153* (0.000)
No. of Obs.	1670	1670	1670	1670	1670
Adj. R^2	0.1994	0.2157	0.0774	0.1048	0.1097

Note: The figures in parenthesis indicate the p values of the coefficients

Table 10d: Sensitivity of Infrastructure Indices to Population Composition

Infrastructure Indices / Independent Variables	CVI	VIA	EL	HF	DF
Per capita income	0.0002* (0.047)	0.0003* (0.000)	0.0001 (0.400)	0.0001 (0.554)	0.0005* (0.009)
Population	0.0014* (0.000)	0.002* (0.000)	0.001* (0.000)	0.002* (0.000)	0.0006* (0.001)
Proportion ST	-8.083* (0.000)	-9.390* (0.000)	-6.191* (0.001)	-7.176* (0.002)	-13.653* (0.000)
Proportion SC	0.594 (0.704)	-0.739 (0.697)	0.932 (0.659)	0.189 (0.944)	4.954 (0.097)
Proportion Muslim	0.748 (0.618)	1.689 (0.354)	-1.030 (0.612)	0.680 (0.791)	3.887 (0.175)
Proportion Christian	1.385 (0.612)	7.027* (0.034)	-0.847 (0.818)	-2.286 (0.624)	-1.388 (0.790)
Proportion Others	4.795* (0.000)	6.296 (0.067)	5.776 (0.131)	2.528 (0.601)	2.573 (0.634)
State Dummies included					
No. of Obs.	1670	1670	1670	1670	1670
Adj. R^2	0.3774	0.3429	0.3140	0.1943	0.3081

Note: The figures in parenthesis indicate the p values of the coefficients

Table 10e: Sensitivity of Infrastructure Indices to Population Composition

Infrastructure Indices / Independent Variables	CVI	VIA	EL	HF	DF
Per capita income	0.0001 (0.122)	0.0003* (0.041)	0.0008 (0.605)	0.0006 (0.753)	0.0005* (0.017)
Proportion ST	-6.452* (0.000)	-7.439* (0.000)	-4.889* (0.008)	-5.586* (0.015)	-12.102* (0.000)
Proportion SC	1.129 (0.453)	-0.318 (0.862)	1.179 (0.576)	1.242 (0.637)	5.454 (0.068)
Proportion Muslim	-0.009 (0.995)	0.582 (0.738)	-1.637 (0.417)	0.019 (0.994)	3.709 (0.195)
Proportion Christian	2.212 (0.397)	8.166* (0.010)	-0.458 (0.900)	-1.363 (0.765)	-0.389 (0.940)
Proportion Others	5.178 (0.056)	7.211* (0.028)	5.501 (0.146)	3.127 (0.509)	2.752 (0.608)
State and Population interaction Dummies included					
No. of Obs.	1670	1670	1670	1670	1670
Adj. R^2	0.4352	0.4197	0.3320	0.2342	0.3342

Note: The figures in parenthesis indicate the p values of the coefficients

VII. Conclusion

This paper analyses effects of community composition as captured by religious fractionalisation index on the provision of public infrastructure. Infrastructure index available are of four types, (i) basic amenities such as water housing and sanitation (ii) education (iii) health and (iv) development factors, from a sample of over 1700 villages from a survey done in 1993 in 16 major states of India. We find that mixed villages in terms of religious composition have higher composite infrastructure index than the more homogeneous ones. This is in contrast to findings in the U.S and Africa where poorer public good provision and lower growth have been attributed to high levels of ethnic fractionalisation. In the Indian case, different religious communities by and large specialise in different occupations, and can therefore be expected to have different tastes over a profile of public goods. However, for public goods demanded by all sections of society, such as water supply, sanitation and lighting, captured in our data-set by village infrastructure and amenities, we find that mixed villages have significantly higher levels of such goods than the more homogeneous ones. Given the fact, that we have not really dwelt on the channels of resource allocation in India, it might just be the case that mixed villages are able to lobby better for funds from above than the more homogeneous ones. One competing explanation for differences in public goods profile across villages is due to differences in per capita income and population and that such differences are not community specific. To test for the same we undertake regressions on different infrastructure indices with proportion of population of each religious group with other Hindus as base. We find no significant differences in tastes of each group except in the case of Scheduled Tribes, whose presence seem to have a negative impact on the provision of all infrastructure services. We are of the opinion that it may be mainly due to the fact that ST's are concentrated in certain remote regions of the country which happen to be underdeveloped.

To have a measure of diversity that is applicable on a nation wide scale in Indian villages we chose the religious grouping of communities. However, given the magnitude of diversity in the Indian population, this may capture a very limited fraction of diversity and may not be the best way to define community composition in certain villages. Given our limitations with the data, this was the best generalisation we have. Although we made a limited attempt to match the voting pattern in the villages in parliamentary elections for a subset of the villages, to see whether villages that elect representatives of the party in power have a better infrastructure index, the analysis did not show any conclusive results. If one could have attempted the same exercise with data from assembly elections, we may have had a better picture, since state governments are more directly responsible for village infrastructure than central governments. From this work we find conclusive evidence that religious heterogeneity, instead of being a detriment works to the advantage for a village in getting a better mix of infrastructure in Indian villages.

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Appendix 1: List of states surveyed

1. Andhra Pradesh
2. Bihar
3. Gujarat
4. Hariyana
5. Himachal Pradesh
6. Karnataka
7. Kerela
8. Maharashtra
9. Madhya Pradesh
10. Orissa
11. Punjab
12. Rajasthan
13. Tamil Nadu
14. Uttar Pradesh
15. West Bengal
16. North Eastern States were clubbed in one catergory, a few villages were selected from Assam, Nagaland, Manipur, Mizoram and Tripura.