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Farmland Prices in a Developing Economy: Some Stylised Facts and Determinants

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The study constructs a district and state level series of farmland prices using the village level data from MIMAP-India survey and identifies the major determinants of farmland prices. The estimates at micro level showed that density of population in the rural areas, food grain yield and distance from the nearest town were the major determinants of farmland prices. When macro variables were added at the All India level, it was found that density of rural population, road density and share of non-agriculture in GDP as well as in work force affected farmland prices positively while rural poverty affected them adversely. The results appear to have implications for urban planning, industrial location and various government programs for rural development and poverty alleviation.

Keywords: Farmland, Urbanization, Distance, Road density

1. INTRODUCTION

Land is the most crucial factor of production in the neo-classical framework and is the nucleus of all farm-related activities. However, being a natural resource, it is fixed at the macro level while is an exchangeable commodity at the micro level, price of which is fixed by the market forces of demand and supply. Farmland prices and factors that affect such prices are of utmost interest to the farming community, real estate appraisers, economic analysts and policy makers. Land price increases are related on the one side to macro economic factors like rapid urbanisation, population growth and economic cycles and on the other side, to the specific factors such as distress selling, land rents etc., which influence the land markets.

Land market transactions play an important role in the process of agricultural transformation. Therefore, a proper understanding of farmland prices, its determinants and the factors responsible for transfer of land ownership occupy a high research priority. In the Indian context, rising urban growth has created a variety of burdensome problems like increasing contraction of agricultural land. Therefore, new land-use policies are de rigueur to provide guidelines for accommodation of expanding urban growth with incessant agricultural land. Formulating policies on the above lines however requires information on farmland prices and an understanding of the process of urbanisation, which is swallowing up agricultural land. In particular, little is known concerning land-price trends as they affect or are affected by land use changes occurring in rural regions.

Though these issues have attracted much attention in the developed countries such as USA[1], they are equally important for a developing economy where more than sixty percent of the population depends on farmland activities for income and employment. Further, the

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[1] For example see Alston (1986), Just and Miranowski (1993) and Shi, Phipps and Colyer (1997).

identification of regions with low farmland prices would help better allocation of industries where the marginal productivity of capital and labour is higher. Incidentally, it has poverty-alleviating effects in terms of employment generation and also restricting migration from rural to urban, where urban sector suffers from the limited capacity to absorb growing labour force of rising urban unemployment and urban poverty.

The land markets in India are regulated in several ways. There are land ceilings acts in each state and the upper limit on land ownership differs from state to state, and also for irrigated and un-irrigated land. There are several restrictions on the conversion of farmland to industrial or residential purposes, constitutional restrictions on the sale and purchase of land owned by some vulnerable groups and high taxes on the transaction of land. The ownership rights to land may be acquired through inheritance or through sale/purchase. Individuals may also gain access to land through (i) land-lease market or (ii) customary use rights in commons or (iii) encroachment on public land (World Bank 1993).

Land markets in India are segmented, comprising of both sale and lease markets. The former operates purely in the domain of purchase and sale transaction of land while the latter is the rental market. The land markets are highly incomplete and imperfect resulting in the persistence of marginal and sub-marginal operational holdings, which can neither be easily added nor disposed of. The foremost imperfection is built-in through legislative restrictions on leasing and tenancy, ostensibly designed to protect the poor but frequently having precisely the opposite effect (Mearns 2000). The heavy transaction costs in land sale-purchase also bring in imperfections in the land markets. Transaction costs include both the official costs in terms of registration fees, stamp duties and surcharges and informal costs in terms of bribes to expedite transactions, fees to informal land values, etc. According to one estimate, these transaction costs account for one-third of the total value of the land transacted. These high costs also explain why so many land holders do not hold effective title to their land. Heavy costs in transacting land market make it more difficult to achieve voluntary land consolidation through market exchange (Heston and Kumar 1983).

In addition to transaction costs, a further reason for sticky land sale-purchase markets in India is the broader social value of land, which considerably exceeds its direct economic value in terms of capitalized farm profits. Land is the most durable of assets and land prices have considerably outstripped the rate of inflation. Land is valued as collateral and provides security against natural hazards and other contingencies. It is of symbolic importance, and land ownership brings a sense of identity and rootedness within a village (Agarwal 1994a). This combination of factors explains why there are so few willing sellers of land under prevailing conditions in rural India.

Given this background of land markets in India, almost all studies on land markets are concentrated on the rental or lease markets[2] while there are a handful studies on the issue of variations and factors influencing these variations in farmland prices. The scarcity of studies on these issues reflects the obscure nature of these markets as well as the fact that the data on farmland prices are hard to find. Specially designed surveys to study the variations of farmland prices and factors influencing these variations are required.

There are a few scattered evidences on the study of farmland prices based on sample surveys confined to few selected villages.[3] These case studies are confined to Ahmednagar

[2] See, for example, Bardhan (1976 & 1984), Basu (1992) and for a general treatment of the Tenancy markets see Basu (1998).

[3] Some of these studies are summarized in the Indian Journal of Agricultural Economics (1991).

district in Maharashtra,[4] Nainital Tarai region in Uttar Pradesh[5] and Nadia and Hoogly district in West Bengal.[6] However, none of these case studies have any clear theoretical focus and pertains to a small, and often non-random sample. Though these studies offer useful insights on farmland prices, it is extremely difficult to draw policy implications based on their results.

In the light of these shortcomings, this paper differs from the existing studies on farmland prices in India in two important ways. First, it is micro as well as macro analysis of farmland prices based on random sample village survey across major states in India. Secondly, a model of the determination of farmland prices is explicitly outlined to discuss and develop a principal hypothesis. The aim of this paper is two fold; first to construct a cross-section for state and district level farmland prices by enumerating the weighted average farmland prices for both irrigated and un-irrigated land based on the extensive survey of 373 villages covering 18 major states in India.[7] Second, to explore the determinants of farmland prices at the micro (village level variables for each state) level as well as at the All India level (state level variables).

A brief description of the survey and the methodological issues involved in the calculation of aggregate farmland prices are given in section II. In section III, we present a profile of farmland prices across districts and states in India. This is followed by section IV presenting a simple model for the determination of farmland prices in India. Section V reports the estimated results followed by the last section summarizing the findings and the main conclusions.

2. SOME METHODOLOGICAL ISSUES

A comparison of land prices in a large country like India is a difficult proposition given the definitional problems and lack of data availability. One of the main difficulties in the collection and analysis of statistics about land prices is the diversified land characteristics across not only regions of the country, but between sites in the same district and villages.

The statistics for farmland prices were collected at the village level based on sample survey (MIMAP-India Survey) for the agricultural year 1994-95 conducted during 1996 for two categories − irrigated and unirrigated farmland. A three-stage sample design was adopted with the first and second stage units as districts and villages and the third stage as households, respectively. For each selected district, a random sample of four villages was

[4] For the study in Maharashtra see Suryawanshi, et. al. (1991). This study is based on both primary and secondary data from five distinct areas of Ahmednagar district.

[5] This study is based on the purposively drawn sample from the Kichha tehsil of Nainital Tarai region. See Pandey, Mani and Tewari (1991).

[6] This study examines the variation of land prices on different size of farms and highlights the factors influencing land market prices in different size-groups of farms in the Nadia and Hooghly districts of West Bengal (Ray, 1991).

[7] This data belongs to MIMAP-INDIA Survey conducted in 1996 by the NCAER, New Delhi and supported by the International Development Research Centre (IDRC), Ottawa, Canada, see, for details, Pradhan and Roy (2003).

selected.[8] The number of districts selected in each state are as follows: thirteen in Uttar Pradesh; ten in Madhya Pradesh; eight in Maharastra; seven in Andhra Pradesh; six each in Bihar, Haryana, Orissa and Rajasthan; five in Gujarat; four each in Himachal Pradesh, Karnataka, Punjab, Tamilnadu, and West Bengal; three in Kerala, and two and one in Assam and Tripura, respectively. The list of selected districts is given in Annex Table I. The total number of selected districts and villages across 18 states were 94 and 373, respectively. The total number of households selected for the analysis is 3364 in rural and 1492 in urban areas from the above-mentioned states.

These data on farmland prices collected from the villages for two categories were separately aggregated to get district and state level statistics. The areas under these two types of land were used as weights in the process of aggregation. The statistics on the total area, both for irrigated and un-irrigated in hectares are available in the District Census Handbook, Village Directory published by the respective State Governments. These statistics are available at an interval of every 10 years. No alternative source for these statistics exists. The data for 1991, 1981 and 1971 on area irrigated and un-irrigated were used as weights. Here, we made every attempt to use the closest year for which data were available. Nevertheless, due to the non-availability of 1991 census data for some villages in few states, 1981 or 1971 census data were considered to derive weights.

For example, the district level farmland prices for irrigated land were arrived at by weighted average of the village level farmland prices. This was the product of farmland prices and the area irrigated per hectare as proportion to the total area irrigated in the sample villages. This is represented as follows:

$$P_{id} = \sum_{i=1}^{n} P_{iv} W_{iv}$$

where $W_{iv} = L_{iv}/T_{id}$

P_{id} is the weighted average price of irrigated land in the district d; P_{iv} is the price of the irrigated land in the village v; L_{iv} is the total irrigated land in the village v; and T_{id} is the total irrigated land in all the sample villages in district d.

The weights used here are the area irrigated for each sample village covering all the agricultural land put together to correspond to the net area sown plus the current fallow land in each village. Area sown more than once during the same year was counted only once. The same procedure was adopted for the computation of district level farmland prices for un-irrigated land.

For some villages in districts like Mallapuram in Kerela, Manila and Bastar in Madhya Pradesh, Sambalpur and Koraput in Orissa, the statistics on area irrigated land were not available. Similarly, data on total un-irrigated area were not available for Ludhiana in Punjab. The districts for which data on both irrigated and un-irrigated farmland were not available are West Nimar in Madhya Pradesh; Kendujhar, Phulbani, Ganjam and Puri in Orissa and all the sample districts in Assam and Nagaland. For these cases, the simple averages were taken to calculate the district and state level prices.

[8] Only three instead of four villages were selected for three districts. These districts were Kachchh in Gujarat; Karnal in Haryana and Phulabani in Orissa. Four villages each were selected for rest of the districts.

The districts for which 1991 census data were used are Nizamabad in Andhra Pradesh; all the five districts in Gujarat and Haryana; Bhilwari, Jodhpur, Jhunjhunu, Dholpur, Bharatpur in Rajasthan; Galasin village in Bilaspur district of Himachal Pradesh. For rest of the districts and states, 1981 census data were used except for Mallapuram in Kerela; Satana in Madhya Pradesh; Koraput in Orissa; Almora and Sitapur in Uttar Pradesh for which 1971 census data on area irrigated and un-irrigated as weights were used.

The series for state level farmland prices were calculated as the weighted averages of the computed district level farmland prices. The estimation procedure was same as that followed for districts except that the weights estimated relied on the data for the sample districts instead of the sample villages. For state level aggregates in Orissa and Assam, simple averages were calculated due to non-availability of data separately on area irrigated and un-irrigated.

3. FARMLAND PRICES ACROSS STATES: A PROFILE

A comparison of total irrigated farmland prices across states shows that the highest price was observed in the states of Kerala and West Bengal, while the lowest was in Orissa and Bihar (Table 1). Orissa also had the lowest price for un-irrigated farmland followed by Madhya Pradesh. The highest price for un-irrigated land occurred in the case of West Bengal followed by Kerala. On an average, the trends of irrigated and un-irrigated land prices were not much different.

It is discernible from Table 1 that farmland prices were highest in those states whose land productivity was not at the top. Agriculturally high productive states, e.g., Punjab and Haryana had much lower farmland prices. Apparently the positive effect of productivity on farmland prices was nullified by other factors, which had a greater influence on land prices than agricultural productivity. The states of West Bengal and Kerala had much higher land prices despite low agricultural productivity. The explanation of high farmland prices in these two states might lie in the successful historical experience of basic land reforms pertaining to tenancy reforms, enactment of land ceiling legislation and redistribution of ceiling-surplus land to the landless and the land-poor, which greatly reduced inequalities in the ownership and operation of farmland. The issue of land reforms was all but ignored in most other states except to the extent of abolishing the *zamindari* system and absentee landlordism with a view to promoting capitalist development in agriculture without breaking land concentration. The Gulf boom could be another reason for very high land prices in Kerala, as huge influx of foreign currency in the form of remittances from the migrated Keralaite labour has greatly increased the demand for real estate development in the state, which has one of the highest population densities in the country.

In rural India, access to land was an issue of fundamental importance. Land played a dual role: aside from its value as a productive factor, land ownership conferred collateral in credit markets, security in the event of natural hazards or life contingencies and social status to the rural households (Mearns 2000). The incidence of poverty was highly correlated with lack of access to land although the direction of causality in that relationship was not clear. Households that depended on agricultural wage labour accounted for less than a third of all rural households but made up almost half of those living below the poverty line (Agarwal 1994b).

The papers published in Moss and Schmitz (2003) on farmland prices in the United States observed that while government programs might have a short term impact on farmland prices, the long term empirical evidence was inconclusive due to the factors like cropping patterns, land productivity and demographics which played an important role in farmland markets. The factors like boom/bust cycles and off-farm market influences in terms of environmental uses, urbanization etc., were also emphasized in various papers.

Taking into account these economic and demographic determinants of land prices, the most important factors among states that influenced land prices in our case seems to be the density of population per square kilometer in the rural areas; road density per square kilometer; people living below poverty in the rural areas; non-agriculture share in the state gross domestic product; workers in the non-agricultural sector as a ratio of agricultural workers; and share of marginal holding in total holding accounting for the process of land reforms could be the other possible determinants of farm land prices, both irrigated as well as un-irrigated (Table 1).

Table 1. Farmland Prices for Irrigated and Un-irrigated Land Per Acre and Their Possible Determinants

	WA price of irrigated land (Rs. 000’)	WA price of un-irrigated land (Rs. 000’)	Density rural population (per sq. km)	Road density per sq km	Rural poverty (%)	State domestic product_nonagri / State domestic product	Proportion of marginal holdings in total	Non agriculture workers /Agri-culture workers
Kerala	572.2	140.7	659	381.7	25.8	74.8	94.0	191.6
West Bengal	211.6	168.5	545	89.3	40.8	71.6	76.4	101.1
Karnataka	187.1	76.0	138	79.2	29.9	69.2	42.0	73.0
Himachal Pradesh	180.8	99.9	113	52.7	30.3	77.5	64.4	87.0
Andhra Pradesh	168.3	58.2	165	65.2	15.9	72.1	59.4	53.5
Haryana	166.4	97.0	288	65.3	28.0	58.2	47.2	87.2
Tamil Nadu	153.4	96.7	289	117.7	32.5	77.8	74.3	78.4
Punjab	140.2	90.4	321	128.2	12.0	54.6	18.7	85.8
Rajasthan	123.8	59.7	130	41.2	26.5	65.5	30.0	78.7
Uttar Pradesh	109.7	55.5	368	96.7	42.3	62.9	75.4	50.0
Tripura	107.8	61.0	333	148.4	45.0	72.8	82.1	73.7
Gujarat	103.7	45.5	81	47.6	22.2	75.6	27.3	109.5
Maharasthra	97.4	53.4	161	124.1	37.9	82.9	40.0	83.4
Nagaland	95.0	68.8	68	122.7	45.0	79.5	6.1	36.1
Assam	84.4	61.3	291	109.4	45.0	65.7	62.2	83.7
Madhya Pradesh	75.4	37.7	108	46.0	40.6	66.6	40.4	51.0
Bihar	73.5	52.5	529	51.4	58.2	62.9	80.1	34.3
Orissa	64.0	24.8	146	168.6	49.7	67.6	54.1	56.9

Source: Land prices are based on MIMAP- survey, rest of data is taken from various Government of India publications, e.g., Economic Survey; various statistical abstracts and statistical outlines of different states; and CSO series published in Economic and Political Weekly – 1998

If the focus shifts to a more disaggregated level, namely the district and village, the variations in farmland prices for both irrigated and un-irrigated seems to be interesting. It is to be mentioned here that for the disaggregated, i.e., district and village level analysis, only the MIMAP-India survey data has been used as no other alternate source of statistics were available. Therefore in the village level regression analysis, we had to stick to the MIMAP survey generated variables and no secondary information was used unlike the case of All India regressions.

A glimpse of farmland prices at the district level (see Annex Table 2) reveals interesting facts. Looking at the table, it is observed that higher farmland prices prevailed in the rural regions of Palaghat and Thrissur in Kerala, Bellary in Karnataka, Kullu in Himachal Pradesh, West Godavari in Andhra Pradesh, Ludhiana in Punjab and Birbhum in West Bengal. In all the above districts, urban population density was very high while rural density was quite low with the exception of Thrissur, which had high rural density. This reflects the demand for more land from the urban areas, which had an impact on the rural land prices by the process of expansion of cities. The phenomenon was prevalent mostly in those districts where urbanization is expanding rapidly due to more industrialization/tourism or other commercial reasons and as a result the cities are growing by encroaching on rural farmlands.

In West Bengal, in the regions of Darjeeling where commercial crops like tea and coffee are produced and where population density is high, the farmland prices in the district were highest in the state for un-irrigated land and the second highest for irrigated land being next only to Birbhum. In Uttar Pradesh, Muzaffarnagar and Saharnpur had the highest farmland prices while Almora had the lowest. In Muzaffarnagar, the population density was highest among the rural regions while it was lowest in Almora. It is to be mentioned here that Saharnpur and Muzaffarnagar also had highest population density in the urban regions in the country as a whole.

It is anticipated that higher level of industrialization leads to greater demand for the urban land and consequently has a bearing on rural land prices as well. This was true in the two most industrialized states namely, Gujarat and Maharashtra. The district level farmland prices for both irrigated and un-irrigated land were highest in Gandhinagar, Pune and Solapur. The density of population was very high in urban areas in Pune and Solapur while rural density was higher in Gandhinagar. On the other hand, farmland prices in these two states were lowest in Kachchh, Bid and Ratnagiri as these districts were also least industrialized and had a low density of population for rural as well as urban areas.

For the least industrialized state of Assam, the survey includes only two districts. These districts were Marigaon and Kokrajhar. The farmland prices were higher in Kokrajhar than in the other district. The density of rural population was higher in Marigaon, while the population density in urban areas was higher for Kokrajhar. In Andhra Pradesh, farmland prices were highest in West Godavari, which is the most prosperous region in terms of agricultural productivity and per capita income. In this region, the density of population was very high for both rural and urban areas. The lowest farmland prices were recorded in the district of Adilabad, which incidentally had the lowest rural as well as urban population density. These hold true for both irrigated and un-irrigated farmland prices in this state.

The explanation provided above considers the effect of one or two variables at a time. However, they may mask true relationships or may suggest relationships, which in fact have other explanations. For this reason it is necessary to turn to multivariate analysis to highlight more precisely the determinants of farmland prices. Before doing so, however, we consider the underlying theoretical issues in the next section to organize the discussion and develop a principal hypothesis.

4. SOME THEORETICAL CONSIDERATIONS

Land as a resource is virtually fixed in terms of total quantity at any point in time, although the division between numerous alternative uses varies considerably through time. In areas where agriculture is not supreme or urban influences are strong, various representations of urban influences needs to be considered in understanding farmland prices. If at any point in the future the expected best and high use of land, which is most profitable would be for purposes of non-agriculture then the current market value of the land would tend to be higher than the agricultural use value. Hence, land under such circumstances would have a higher valuation.

Several factors influence the changing pattern in farmland prices. Among them are the density of population per square kilometer, the rate of economic growth, the increase in the purchasing power of the population, the rate of inflation, the distance from the nearest urban center and approach to farmland through *pucca* or good-conditioned road. The urban center affects land use and values through residential developments, recreational enterprises and other non-agricultural uses. Thus, land values are affected by a number of forces, which have varying degrees of influence in different areas.

Farmland prices acquired for non-agricultural purposes generally must pay a premium to bid the land away from its agricultural uses. The sale of land at prices above those that had prevailed in an area would tend to increase the value of all land, since prices convey information and owners would therefore raise their expectations. Investment of public and private capital in the development of irrigation facilities and in public and private service enhance the rural environment and also increase the value of farmland.

In this paper we consider four elements, which form the basic determinants of farmland prices in the econometric equations: farm income or returns, location, population pressure and farmland utilization characteristics. The first variable implies that higher returns from land would cause an increase in land prices. Agriculture is one of the most important uses of land and therefore reasons enough for the purchase of land, even in areas where urban influences are strong. Land put to food grain and non-food grain production reflects differential returns in agricultural uses and therefore these variables are imperative to model farmland prices. Hence, food grain and non-food grain yields are considered separately in the price equations.

The location variable in the farmland price equations signifies the fact that demand for rural land for non-agricultural purposes is becoming increasingly important. Generally, in a number of regions, high farmland prices are found near urban fringes. This suggests that location of farmland with respect to urban centres is an important determinant of farmland prices. Population pressure on land is another determinant of farmland prices. This includes both urban and rural density of population and also the combined effect of the both. The demand for farmland could be from the urban residents demanding land for multiple purposes, i.e., for cultivation, for residential complexes and for the location of industrial units, etc. Higher the density of population more the demand and hence higher would be the price of farmland. Therefore, all three components of population pressure, namely urban, rural and combined are considered in the econometric exercises.

The specification also includes the pattern of land utilization. The price of irrigated farmland would depend on the price of un-irrigated farmland as, generally, a margin is added to the price of un-irrigated farmland which includes the cost of public and private investment in developing irrigation facilities in the process of conversion of un-irrigated farmland to irrigated farmland. Precisely, this is also the reason why we have treated irrigated and un-irrigated farmland prices separately, as their cropping pattern as well as other uses, differ on these two pieces of land.

Based on the above theoretical considerations, the model is specified as follows:

$$P_f = \alpha + \beta_1 FY + \beta_2 NFY + \beta_3 D + \beta_4 U + \beta_5 R + \beta_6 T + \beta_7 P_i + \beta_8 P_{iu} + e_f$$

Here if $f = i$ then $\beta_7 = 0$;
and if $f = iu$ then $\beta_8 = 0$

where the coefficients of all the variables except D are positive, a priori. FY and NFY are foodgrain and non-foodgrain yield variables. The distance variable (D) is quantified as the average distance from the nearest town. The variable representing population pressure is considered separately for rural (R), urban (U) and the total (T). The price of farmland is bifurcated into irrigated (P_i) and un-irrigated (P_{iu}) farmland prices.

5. THE RESULTS

5.1. Micro Estimates

The econometric estimates based on the above model at the district and village level are presented in Table 2. The variable Distance specified in the model is the simple average of the distance from the nearest town to the village for a particular sample district. While Density_R, Density_U and Density_T are also computed based on only those villages, which are included in the sample. This is also true for the variables, Foodgrain Yield and Non Foodgrain Yield.[9] Since statistics at the village level were not available for rural (R), urban (U), total (T), FY and NFY, the district level figures were assumed to hold good at the village level in any particular district. Numerous combinations of the above-mentioned variables were estimated with various forms of specifications including linear and log linear equations. The results reported here are the best among the alternative specifications estimated. In the following section, we discuss regression results at the village level based on the primary survey data succeeded by the results at the All India level with the primary and secondary data of 18 states.

In a large number of states, rural density of population, food grain yield and distance from the nearest town were the most significant determinants for irrigated farmland prices. The density of population in rural areas was significant for Andhra Pradesh, Madhya Pradesh,

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[9] The district wise crop production included in FY are Rice, Jowar, Bajra, Maize, Ragi, Small Millets, Wheat, Barley, Gram, Arhar and Other Pulses. Under NFDY the crops included are Groundnut, Sesamum, Rapeseed & Mustard, Linseed, Castorseed, Safflower, Nigerseed, Soyabean, Sunflower, Sannhemp, Tea, Coffee, Rubber, Chillies, Ginger, Turmeric, Pepper, Arecanuts, Coriander, Cardamom, Garlic, Potato, Sweet Potato, Tapioca, Banana, Onion, Sugarcane, Tobacco and Guarseed.

Tamilnadu, Maharashtra and Uttar Pradesh, while food grain yield was significant for Andhra Pradesh, Himachal Pradesh, Orissa, Tamilnadu and Uttar Pradesh. The distance from the nearest town was significant for Haryana, Himachal Pradesh, Kerala, Madhya Pradesh and Tamilnadu.

In the case of un-irrigated farmland prices, rural density of population and food grain yield were the most important determinant in majority of states. The density of population in rural areas was significant for Andhra Pradesh, Himachal Pradesh, Madhya Pradesh, Punjab, Tamilnadu and Uttar Pradesh. Food grain yield was significant in Himachal Pradesh, Orissa, Tamilnadu and Uttar pradesh. The significance of food grain yield or returns from land has been pointed out in the literature. These studies utilized the rent capitalization models to show that net returns to agriculture activities in conjunction with other explanatory variables is a significant variable in explaining agricultural land prices (Alston 1986; Featherstone and Timothy 1987; Runge and Halbach 1990).

Now for analytical reasons, we focus our concern to the specific states and the determinants thereof, for both irrigated and un-irrigated farmland prices.

The density of population in rural areas and food grain yield were the significant factors in explaining farmland prices in Andhra Pradesh. Certain regions in this state were highly prosperous in terms of agricultural production. Therefore, return from farmland in terms of food grain yield turned out as a significant variable. The price of un-irrigated farmland was the major determinant of prices for irrigated farmland in Bihar, Gujarat and Haryana. The estimates for the un-irrigated farmland in these three states did not show any significant relationship with any of the variables in the specification. While in the case of Haryana, the distance from the nearest town was also significant in explaining irrigated farmland prices in the state. Haryana has a highly commercialized and developed agricultural sector. This region is comparable to the regions in U.S.A, where a study using distance from an urban area as a linear explanatory factor indicates that proximity to an urban area is more important in determining agricultural land values (Shi et al. 1997). Another study by Cavailhès and Wavresky (2003) on France revealed that in peri-urban belts, landowners expect agricultural parcels to be converted to urban uses and so farmland prices fell with distance from cities, owing to premia reflecting potential capital gains from such future development.

Table 2. Determinants of farmland prices based on village level statistics across states (MIMAP-India survey data)

State	Dep.	Cons (α)	Fgrain (β_1)	NFgrn (β_2)	Distnc (β_3)	Dens_R (β_4)	Dens_U (β_5)	Dens_T (β_6)	P_i (β_7)	P_{ui} (β_8)	R^{-2}
Andhra Pradesh	P_i	-37.4	0.03 (2.8)		-0.31 (-0.6)	0.51 (5.7)					0.82
	P_i	-38.8	0.03 (2.6)		-0.36 (-0.7)	0.45 (3.4)	0.005 (0.6)				0.81
	P_{ui}	28.4	0.01 (1.2)		-0.23 (0.3)	0.11 (2.4)					0.40
Bihar	P_i	-4.1	0.01 (0.8)		-0.02 (-0.1)		0.004 (1.8)			1.26 (6.4)	0.63
	P_i*	0.04	0.06 (0.4)		-0.008 (-0.2)		0.12 (1.7)			0.74 (7.3)	0.68
Gujarat	P_i*	1.0		0.03 (1.1)	-0.05 (-0.7)	0.03 (1.1)				0.80 (11.0)	0.90

Haryana	P_i	-7.9			-0.39 (-2.1)		0.004 (0.9)			1.56 (23.0)	0.96
Himachal Pradesh	P_i*	-94.1	12.16 (2.3)		-0.31 (-2.8)	1.16 (1.5)	0.53 (1.1)				0.74
	P_{ui}*	-141	17.38 (3.4)		-0.35 (-3.4)	2.09 (2.7)	1.03 (2.1)				0.75
Kerala	P_i	-292		0.08 (4.3)	-12.97 (-2.5)					2.13 (3.6)	0.65
	P_i*	-17.0		1.15 (4.6)	-0.11 (-0.7)		0.91 (1.5)			1.21 (5.3)	0.75
	P_{ui}*	-212		9.94 (1.8)	-0.24 (-1.0)			20.02 (1.9)			0.39
Maharashtra	P_i	-148	0.01 (0.6)	0.001 (1.1)		0.86 (2.8)	0.01 (4.1)				0.40
	P_i*	-2.24		0.01 (0.6)		0.88 (4.2)	0.17 (2.3)			0.01 (9.8)	0.86
	P_i	-56.5	0.006 (0.5)	0.0001 (0.1)		0.13 (0.4)	0.01 (2.0)	0.36 (2.9)			0.53
	P_{ui}	8.82	0.001 (0.4)		-0.13 (-1.3)		0.002 (1.7)		0.43 (8.4)		0.75
Madhya Pradesh	P_i	25.3	0.002 (0.2)		-0.93 (-3.6)	0.26 (3.0)	0.009 (2.6)				0.48
	P_i*	-2.8		0.36 (4.2)	-0.19 (-3.2)	0.80 (7.1)	0.15 (1.7)				0.73
	P_{ui}	5.9	0.007 (0.6)		-0.48 (-3.1)	0.17 (3.2)	0.005 (2.4)				0.48
	P_{ui}*	-3.9		0.33 (3.5)	-0.17 (-2.7)	0.89 (7.3)	0.20 (2.2)				0.72
Orissa	P_i*	-8.6	1.71 (4.1)		-0.18 (-1.3)	0.18 (1.3)					0.63
	P_{ui}*	-8.1	1.48 (2.6)	0.09 (0.3)	-0.007 (-1.9)	0.001 (0.8)					0.67
Punjab	P_i	-11.6			-1.31 (-0.7)	0.03 (0.2)	0.002 (0.4)			1.70 (8.1)	0.86
	P_{ui}*	-9.6	0.70 (1.1)			1.45 (2.1)					0.13
Rajasthan	P_i	-27.8	0.01 (1.7)			0.03 (0.7)	0.01 (2.4)			1.17 (10.5)	0.83
Tamil Nadu	P_i	-29.1		0.003 (2.2)	-2.15 (-2.1)	0.04 (2.0)				1.16 (9.4)	0.93
	P_i*	-2.55	0.59 (4.3)		-0.04 (-0.9)			0.42 (4.5)			0.67
	P_{ui}*	-3.90	0.65 (2.3)	0.003 (0.02)	-0.05 (-1.1)	0.54 (5.3)					0.67
Uttar Pradesh	P_i	-5.1	0.03 (4.7)		-0.27 (-1.1)	0.10 (4.0)					0.58
	P_{ui}	-2.4	0.01 (2.3)	2.11 (0.1)	-0.23 (1.3)	0.10 (5.1)					0.58
West Bengal	P_i	-42.5	0.01 (0.9)		-0.26 (-1.0)	0.07 (2.0)				1.27 (14.3)	0.94

Note: Equations with (*) are in log form

The distance from the nearest town and the food grain yield were the significant factors influencing both irrigated and un-irrigated farmland prices in Himachal Pradesh. For the prices of un-irrigated farmland, both rural and urban density of population also showed significant relationship. In Tamilnadu, among the determinants for the price of irrigated land, the most significant were non-food grain yield, distance and density of rural population while for un-irrigated farmland, distance from the nearest town was insignificant. Urbanization does not seem to influence the un-irrigated farmland prices in the rural regions of Tamilnadu. Population pressure on land and the food grain yield were the major determinants of un-irrigated farmland prices in this state. This conclusion is true for Uttar Pradesh as well for both irrigated and un-irrigated farmland.

The distance from the nearest town as well as NFY and P_{iu} were significant in Kerala. The significance of NFY is not surprising as most regions of this state are under commercial crops, which have higher returns. This variable was also a significant factor in explaining the price of un-irrigated farmland prices apart from the combined influence of urban and rural density of population.

The estimates for farmland prices in Maharasthra show that the density of population in urban areas was a significant variable in all the specifications indicating a positive impact of industrialization of the state on farmland prices as is highlighted in section III. For the un-irrigated farmland prices, the inclusion of P_i increased the overall fit and the level of significance.

The distance from the nearest town and density of population in both rural and urban areas were significant factors across all specifications for Madhya Pradesh, while non-food grain yield was a significant variable in some specifications. The food grain yield was the only significant variable in explaining both irrigated and un-irrigated farmland prices in Orissa. Density of rural population was the major determinant of un-irrigated farmland prices in Punjab while P_{iu} was the only variable significant in the case of irrigated farmland.

Finally, the density of population in urban areas was a significant variable for Himachal Pradesh, Maharashtra, Madhya Pradesh and Rajasthan. This reflects the demand for farmland from the urban residents for various reasons including for purposes of capital gains and location of industries. This is especially important for the relatively more industrialized state like Maharashtra. Similar to our case where population density, rural as well as urban, had positive effect on farmland prices in almost all states as seen above, a study in the United States also shows similar trends for the agricultural land prices. Kaltsas et al., (2005) in their Roanoke County models of OLS, GME and 2SLS observed that the initial OLS and GME models suggested that land values increased with higher population density but at a decreasing rate. However, their 2SLS and the OLS fixed effects models for developed parcels indicated that increased population density was related to lower land values differing from the results observed in the above case. Further, population density was not significant in the OLS fixed effects model for undeveloped parcels.

The above discussion on prices of farmland across states exhibits that returns from land in terms of food grain yield, location of farmland and population density in the rural areas were the major determinants of farmland prices in the village level survey data. Farmland prices in poorer states like Orissa, Bihar, Assam and Madhya Pradesh were at the bottom. This gives tremendous potential in the location of industries and services in these states along with the development of necessary infrastructure, as marginal productivity of capital and labour in these sectors would be much higher.

5.2. Macro Estimates

After having a discussion based on the village level survey data, we proceed for the determinants of land prices at the all India level based on primary and secondary information for the 18 major states[10]. The additional variables used in this model were; road density per square kilometre, people living below poverty in the rural areas, non agriculture share in the state gross domestic product ($SGDP_{na}$), workers in the non agricultural sector as a ratio of agricultural workers ($worker_{na}$), state domestic product from the agriculture sector as a ratio of net sown area of the state (agri-productivity) and share of marginal holdings in total holdings (marginal holdings). From the above-mentioned variables, the only significant variables were retained in the model and the results are presented in Table 3.

Among the primary variables discussed above in the village results, only the variable of rural density was found significant at the all India level while all other variables, namely distance, urban density and food & non food grain yield were found insignificant. The rural density was significant in both irrigated as well as un-irrigated farmland prices. Among the other secondary variables: road density; rural poverty; $worker_{na}$; and marginal holdings were the other major determinants of irrigated farmland prices. In the case of non-irrigated farmland prices: rural density, rural poverty; agri-productivity; and $SGDP_{na}$ were the major significant determinants (see Table 3). Apparently, GDP_{agri} per acre of cropped area better represented agricultural productivity at all India level, rather than food or non-foograins yields as was the case with village level regressions. The variable of distance in the aggregate equations might have been mis-specified because of the aggregation bias.

The road connects hinterland and remote areas of a country to the mainland and big cities. Therefore it is a very significant indicator of rural development. It generates demand for farmland for the purposes of agricultural surplus as well as for the secondary and tertiary activities. Thus, road density per square kilometre and farmland prices are expected to be positively related. The sign of the coefficient of road density as seen in Table 3, turned out positive and significant in the case of irrigated land but negative and insignificant in the case of un-irrigated farmland. The implication is that the farmland well-connected with road would have higher market value compared to the farmland in remote areas where there is no road connectivity. However, this was true only in the case of irrigated farmland. The coefficient of un-irrigated farmland with respect to road density was insignificant possibly because of subsistence nature of crops sown on un-irrigated farmland (Kumar 1999).

As mentioned elsewhere, rise in the share of manufacturing and service sector in the economy, leads to higher demand for farmland for non-agricultural purposes. This was indicated by the positive and significant coefficients of $SGDP_{na}$ and $worker_{na}$ (see Table 3). As share of non-agriculture income or non-agriculture workers increase in the economy that leads to higher demand for both irrigated and un-irrigated farmland for residential and other commercial purposes resulting into higher prices for such land. The coefficients were significant for both these variables in almost all specifications for irrigated as well as un-

[10] For the secondary variables we used reports and publications of various agencies like, Economic Survey, Ministry of Finance, Government of India; Directorate of Economics and Statistics, Government of Delhi; Statistical Abstracts and Outline of India, Department of Economics and Statistics, GOI; and CSO series published in Economic and Political Weekly - 1998.

irrigated farmland. Last but not the least, increase in agricultural productivity and fall in rural poverty, both led to higher farmland prices.

Table 3. Determinants of farmland prices in India (data across 18 states)

Irrigated farmland prices									
Dep. Var.	Const	Density Rural	Poverty Rural	Road Density	$SGDP_{na}$	Distance	Marginal Holdings	$Worker_{na}$	R^{-2}
P_i	-81.1	0.30 (2.9)	-4.31 (-3.7)	0.66 (2.9)	331.4 (1.6)				0.77
P_i	-44.3	0.32 (3.1)	-4.87 (-3.8)	0.67 (3.0)	252.7 (1.2)	1.50 (1.0)			0.77
P_i	15.03		-2.50 (-1.7)	0.57 (2.4)			1.14 (1.8)	127.3 (2.0)	0.79
Unirrigated farmland prices									
Dep. Var.	Const	Density Rural	Poverty Rural	Road Density	$SGDP_{na}$	Marginal Holdings	$Worker_{na}$	Agri-productvity	R^{-2}
P_{ui}	-32.3	0.19 (3.3)	-1.13 (-2.1)		162.0 (1.8)	-0.29 (-0.7)			0.50
P_{ui}	-39.6	0.18 (3.8)	-1.32 (-2.5)	-0.09 (-0.8)	174.9 (1.9)				0.50
P_{ui}	-109.7			-0.03 (-0.3)	158.6 (2.1)			0.40 (5.2)	0.64
P_{ui}	-118.0	0.04 (0.8)		-0.06 (-0.6)	173.2 (2.2)			0.36 (3.6)	0.63
P_{ui}	-3.21						30.88 (1.8)	0.28 (3.7)	0.64
P_{ui}	-104.1				149.9 (2.2)			0.39 (5.9)	0.66

Note:
Equations based on primary and secondary data

The results obtained at the aggregate and village level regressions in our analysis of farmland prices in India are mostly in consonance with that observed in the literature for other developing or developed countries. Measuring the effects of potential land development on agricultural land prices in the U.S., Plantinga et al. (2002) observed that the marginal effect of population change variance on farmland values were positive and significantly different from zero, suggesting that option values associated with delaying irreversible land development were capitalized into current farmland values. The study further reveals that in counties near urban centers, expected future development rents often accounted for more than half of agricultural land values, suggesting that landowners would require substantial financial compensation to forego such development rents.

Looking at the influence of urban growth and its related policies on amenity values of farmland in the United States, Libby and Irwin (2002) postulated that the policies aimed at protecting farmland and reducing urban sprawl did not have a significant impact on farmland prices. Barnard et al. (2002), however, found that 17 percent of the farmland in the United States was influenced by urbanization and the very process of urbanization had increased the market price of farmland increasing the entry cost of new farmers and the cost of expansion for existing farmers. Carlsberg and Furtan (2002) empirically examined the impact of restrictions on the foreign ownership of farmland by non-residents in the case of Saskatchewan in Canada. The authors observed that these restrictions did not have an adverse effect on farmland values in Saskatchewan.

Carolina Trivelli (1997) provided an overview of the land market situation in the CEFTA countries, namely Poland, Hungary, Czech and Slovak Republics and Slovenia. Governments in these five countries define a set of land prices based on land productivity. In Poland, Hungary and Slovenia, some additional land characteristics, such as location or irrigation, were incorporated in these prices. The author observed that due to the transition process in all five countries, there were high transaction costs in the dealings related to land markets. Transaction costs were augmented by unstable economic environments like inflation, variable interest rates that affected the recognition and value of land as an asset. In the same sense, social, cultural and political factors that define additional values for land were present in most of these countries making it even more difficult to measure and define accurately land prices. The study by Kaltsas et al. (2005) evaluated land prices with respect to several factors like parcel size, elevation of soil, population density, location factor, etc. The authors observed that the OLS, 2SLS and GME models indicated that land values per square meter decreased with parcel size at a decreasing rate and the differences in estimated coefficients were small. With respect to land surface and location, authors observed that higher elevation increased the value of the parcel at a decreasing rate and land value increased with distances from town and mall. Further, the models indicated negative relationship between parcel value and location near a majority highway.

6. CONCLUDING REMARKS

It is interesting to study the cross section of farmland price movements in a developing economy like India where land markets unlike many other countries are regulated in terms of land ceiling, restrictions on the conversion of farmland to industrial or residential purposes, constitutional restrictions on the sale and purchase of land owned by some vulnerable groups and high taxes on the transaction of land.

The study first enumerates a district and state level series of farmland prices using the village level data from MIMAP-India survey. It identifies major determinants of farmland prices for states and for all-India level through a simple model. The specifications were estimated for each State and for all India, separately.

The district level estimates of farmland prices and its determinants presented in the text give quantitative information to urban planners and policy makers who want to know the level of farmland prices and who want a complete understanding of the effects of urbanization and the other determinants causing an increase in these prices.

The regions with low and high farmland prices were identified and their determinants estimated. These results will help the policy makers to identify regions with low farmland prices to develop infrastructure in these regions for the promotion of industry, tourism and the service sector. This will increase the marginal productivity of capital and labour and will help alleviate poverty in those regions.

In a diverse country like India, the results for various states are likely to be different. However, the estimates using village level variables showed that the major determinants of land prices for most of the states, both for irrigated as well as un-irrigated land were density of population in the rural areas and food grain yield. Besides, distance from the urban center to the village was a significant factor for the irrigated farmland prices only. The association of irrigated land with distance was due to market surplus generated by farmers on such land. On the other hand, subsistent nature of cropping pattern on un-irrigated land rendered the transportation factor ineffective in the latter case.

At macro/aggregated level, we tested some important variables, which were likely to affect land prices but it was not possible to test them at the micro level, due to the unavailability of data. It was found that the density of population in the rural areas, share of non-agriculture sector in SGDP and ratio of non agriculture to agriculture workers affected farmland prices both irrigated and un-irrigated positively while rural poverty affected them inversely. Road density turned out to be a significant determinant of only irrigated farmland prices. The estimated regressions had a good fit with a high level of explanation and statistical significance and had the expected signs.

The results of the study appear to have implications for urban planning, industrial location and various government programs for rural development and poverty alleviation.

Annex Table 1. Names of the Districts Selected in each State and the Number of Villages Surveyed

States	District	Number of villages
Andhra Pradesh	(1) Chittoor (2) Prakasam (3) Adilabad (4) Cuddapah (5) West Godavari (6) Medak (7) Nizamabad	28
Bihar	(1) Nalanda (2) Purba Champaran (3) Muzaffarpur (4) Saharsa (5) Bhagalpur (6) Ranchi	24
Gujarat	(1) Kachchh (2) Kheda (3) Gandhinagar (4) Bharuch (5) Surendranagar	19
Haryana	(1) Bhiwani (2) Gurgaon (3) Sonipat (4) Kaithal (5) Karnal (6) Faridabad	23
Himachal Pradesh	(1) Kullu (2) Bilaspur (3) Mandi (4) Shimla	16
Karnataka	(1) Raichur (2) Bellary (3) Chitra Durga (4) Shimoga	16
Kerala	(1) Thrissur (2) Mallapuram (3) Palaghat	12
Maharasthra	(1) Nashik (2) Dhule (3) Satara (4) Solapur (5) Bid (6) Yavatmal (7) Ratnagiri (8) Pune	32
Madhya Pradesh	(1) Datia (2) Satana (3) Ratlam (4) West Nimar (5) Batul (6) Hosangabad (7) Mandla (8) Bilaspur (9) Durg (10) Bastar	40
Orissa	(1) Sambalpur (2) Kendujhar (3) Phulabani (4) Ganjam (5) Puri (6) Koraput	23
Punjab	(1) Gurdaspur (2) Ludhiana (3) Sangpur (4) Hoshiarpur	16
Rajasthan	(1) Udaipur (2) Bhilwara (3) Jodhpur (4) Jhunjhunu (5) Dholpur (6) Bharatpur	24

Tamil Nadu	(1) Dharampur (2) Coimbatore (3) Tiruchirapalli (4) Kannyakumari	16
Uttar Pradesh	(1) Sultanpur (2) Almora (3) Banda (4) Baharaich (5) Saharanpur (6) Muzaffarnagar (7) Rampur (8) Bijnor (9) Fatehpur (10) Sitapur (11) Nainital (12) Moradabad (13) Hardwar	52
West Bengal	(1) Birbhum (2) Maldah (3) Bardhaman (4) Darjeeling	16
Assam	(1) Marigaon (2) Kokrajhar	8
Nagaland	(1) Kohima	4
Tripura	(1) West Tripura	4
Total number of states = 18	Total number of districts = 94	Total number of villages = 373

Annex Table 2. Farmland Price per acre and Population Density of Districts Across States

States	District	Weighted Average Price of Irrigated Land (in Rs. '000)	Weighted Avg Price of Un-irrigated Land (in Rs. '000)	Total Populat. per Sq. Km.	Rural Populat. per Sq. Km.	Urban Populat. per Sq. Km.	Average Distance from the Nearest Town (K.M)
Andhra Pradesh	Chittoor	131.31	89.02	216	175	3150	15
	Prakasam	94.88	69.58	157	133	1590	12
	Adilabad	58.91	35.41	129	101	2384	17
	Cuddapah	89.68	51.25	148	114	2320	19
	West Godavari	265.82	124.98	454	367	5247	15
	Medak	75.97	48.7	234	203	2369	19
	Nizamabad	110.68	69.09	256	207	4320	9
Bihar	Nalanda	69.34	42.58	844	751	2923	9
	Purba Champaran	113.29	67.04	767	734	2921	14
	Muzaffarpur	92.54	46.15	931	860	4967	26
	Saharsa	91.56	63.13	602	575	1635	30
	Bhagalpur	82.03	37.63	573	511	4563	22
	Ranchi	85.07	63.58	288	201	2249	47
Gujarat	Kachchh	60	53.49	28	19	1110	7
	Kheda	75.9	37.89	478	390	2094	7
	Gandhinagar	125.42	79.37	630	419	2312	7
	Bharuch	88.84	63.2	171	137	2582	10
	Surendranagar	66.24	42.49	115	84	939	5
Haryana	Bhiwani	117.3	66.73	222	185	3821	5
	Gurgaon	191.38	112.91	415	340	3136	8
	Sonipat	148.57	95	545	429	4564	10
	Kaithal	207.42	171.18	293	253	4190	11
	Karnal	179.03	140	450	334	5572	28
	Faridabad	122.7	93.68	702	397	3798	22
Himachal Pradesh	Kullu	294.44	137.36	55	51	1508	23
	Bilaspur	102.08	66.18	253	242	960	16
	Mandi	147.59	80.32	197	184	1930	43
	Shimla	75	41.05	120	97	2492	62
Karnataka	Raichur	136.86	57.78	165	132	2393	17

	Bellary	428.73	98.69	191	140	1391	28
	Chitra Durga	98.78	55.01	201	148	6019	20
	Shimoga	75.74	54.45	181	135	3210	11
Kerala	Thrissur	440.86	206.74	903	739	2391	8
	Mallapuram	350	237.92	872	833	1647	11
	Palaghat	737.49	122.25	532	471	1688	28
Maharasthra	Nashik	86.51	45.34	248	165	2642	38
	Dhule	71.58	41.45	193	155	4878	23
	Satara	76.5	44.48	234	208	1503	20
	Solapur	111.57	76.15	217	156	5442	23
	Bid	61.35	42.13	170	141	3549	14
	Yavatmal	87.98	55.56	153	127	5342	26
	Ratnagiri	64.76	39.88	188	173	2405	34
	Pune	175.21	81.96	354	181	4868	34
Madhya Pradesh	Datia	60.45	48.36	194	153	3554	30
	Satana	96.28	44.23	195	163	965	19
	Ratlam	110.7	53.47	200	139	3103	17
	West Nimar	72.5	43.75	151	129	3777	10
	Batul	71.26	35.02	118	96	4275	34
	Hosangabad	50	24.27	126	93	1956	19
	Mandla	42.5	21.35	97	90	1153	28
	Bilaspur	81.31	47.99	191	161	1685	9
	Durg	55.38	36.72	281	189	2659	23
	Bastar	22.5	13.51	58	54	2292	27
Orissa	Sambalpur	63.75	35	154	130	1429	13
	Kendujhar	37.5	15	161	144	910	33
	Phulabani	56.67	33.33	78	73	1023	9
	Ganjam	113.75	63.75	252	219	1678	9
	Puri	71.25	46.75	353	292	2398	14
	Koraput	41.25	20.54	112	100	1172	34
Punjab	Gurdaspur	139.71	99.91	493	393	5056	9
	Ludhiana	259.57	132.5	641	336	6302	8
	Sangpur	101.31	67.33	335	257	4939	8
	Hoshiarpur	165	87.54	375	325	2716	11
Rajasthan	Udaipur	94.68	67.4	167	141	2127	39
	Bhilwara	124.32	78.63	152	127	881	30
	Jodhpur	60.07	52.68	94	61	3665	65
	Jhunjhunu	117.53	71.36	267	217	2294	14
	Dholpur	176.18	116.18	247	209	2003	18
	Bharatpur	93.64	47.25	326	270	2457	11
Tamil Nadu	Dharampur	93.53	41.14	252	230	3228	8
	Coimbatore	132.36	102.7	470	255	1975	11
	Tiruchirapalli	141.19	78.81	373	283	2892	14
	Kannyakumari	198.5	154.76	950	812	5874	7
Uttar Pradesh	Sultanpur	83.7	69.46	577	555	3985	39
	Almora	38	23.79	155	146	1421	22
	Banda	47.49	30.81	244	214	5620	20
	Baharaich	91.95	72.66	402	372	6699	7
	Saharanpur	122.82	78.91	626	473	11414	11

	Muzaffarnagar	166.52	106.55	709	544	10302	14
	Rampur	97.89	85.44	635	482	6231	14
	Bijnor	72.99	50.51	538	409	9047	9
	Fatehpur	95.01	68.82	457	420	2378	7
	Sitapur	89.13	70.95	497	444	4288	21
	Nainital	87.86	75.56	227	156	4032	9
	Moradabad	138.51	107.95	691	512	7712	15
	Hardwar	107.5	80	476	338	5391	7
West Bengal	Birbhum	244.88	145	562	519	3801	25
	Maldah	173.62	145.94	706	660	8985	38
	Bardhaman	187.1	135.88	861	618	3179	29
	Darjeeling	197.64	205.07	413	293	5717	11
Assam	Marigaon	77.5	57.5	410	393	1841	11
	Kokrajhar	91.25	65	256	241	2949	8
Nagaland	Kohima	95	68.75	96	68	1999	52
Tripura	West Tripura	107.79	60.96	427	333	3198	32

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