Journal of Economic Analysis

Homepage: https://www.anserpress.org/journal/jea

Agglomeration Economies and Rural-to-Urban Migration in India

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ABSTRACT

Keeping in view the concept of agglomeration economies and the New Economic Geography (NEG) angle, this paper makes an attempt to examine the rural to urban population movement at the district level in India. The findings do not favour a strong positive association between levels of urbanization and migration rates. However, there exists a cluster of districts which are able to attract migrants on a large scale in spite of being already urbanized. The work participation rate, share of services and construction work, and literacy rate all form parts of this positive nexus, indicating that opportunities exist with increased levels of urbanization which in turn prompt people to migrate. The positive spill-over effects of higher levels of urbanization are not limited to the urban spaces only as the adjoining rural areas also seem to have undergone a significant transformation. The land use pattern and activities are changing and some of the developmental impact is evident. However, the regional variations in this respect are evident. There are sharp differences in the relationship between urbanization level and migration rates across regions. The nature of urbanization and its determinants and the outcome variables of urbanization and migration also unravel regional variations. Besides, there are many districts with higher levels of urbanization; yet, they are not able to attract migrants at a rapid pace. New investment opportunities can be created in these spaces to reduce the cost of growth and make employment generation process more effective, facilitating the rural population to take the benefits of agglomeration economies.

KEYWORDS

Migration; agglomeration; urbanization; rural; mobility

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ISSN 2811-0943
doi: 10.58567/jea03020006

Received 26 June 2023, Accepted 25 July 2023, Available online 7 August 2023, Version of Record 15 June 2024

1. Introduction

The lockdown of 2020 following the outbreak of the COVID-19 pandemic, unravelled the massive number of migrants who reside in cities, originating from the rural and other small urban areas. Indirectly, it confirms the huge contributions the migrants make to the growth and value addition cities create, and in return, the sources of livelihood they access for themselves in the urban space. This is despite the huge amount of social costs the migrants incur (Rajan, 2013) and the shortcomings of the institutional responses, which pushed migrants into enormous physical, psychological, and economic vulnerability as witnessed during the COVID-induced lock-down (Rajan, 2020). Regions, particularly with large cities, which were characterised by high incidences of migration were the ones to witness massive increases in unemployment rate though during the pre-COVID situation it was just the opposite (Mitra and Singh, 2021). This tends to confirm that during the normal situations the migrants were rational in making their decisions to shift to large cities, offering economic opportunities. Though the decadal migration rates do not appear to be phenomenal, particularly among the males, there are some districts which reported a rate of more than 15 per cent: nearly 6 and 12 per cent of the districts showed a migration rate of more than 15 per cent among the males and females respectively (Table 1). This tends to offer a basis to formulate the hypothesis that highly urbanized districts with large cities within their territory might be drawing migrant population at a rapid pace.

This paper proposes to examine the rural to urban migration rates for males and females separately, in the backdrop of the agglomeration economies. The main objective is to assess the role of urbanization in stimulating further migration. In other words, regions which are already urbanized are considered to examine if they induce new migration or alternatively if the potential migrants try to shift to places which are not crowded by the earlier migrants. Some of the causal and the outcome variables of migration and urbanization are analysed in accepting/rejecting our hypothesis. The main contribution of this study lies in the fact that it tries to explore the links between urbanization and migration in the light of the agglomeration economies and the New Economic Geographic perspective. The rest of the paper is structured as follows: section 2 reviews the existing literature, highlighting the determinants of migration and develops a theoretical perspective for analysing the association between urbanization and migration. Section 3 focuses on data and methods on which our analysis is based. The key findings are presented in section 4 and finally, section 5 concludes.

2. Literature Review

What determines migration, in what way the urban job market information is accessed, whether migration is associated with strong payoffs and who would migrate are important questions (Rajan, 2013; Lang et al., 2021). Similarly, whether migration results in remittances and how the remittances are spent by the rural households encompass a great deal of discussion (World Bank Group, 2019). Consumption smoothing and rural investment are some of the important aspects on which the literature has gained momentum. While rural investment is instrumental to long term gains, consumption support drawn from remittances is rather seen as short-term benefits.

In the study by (Ghafoor et al., 2021) migration is found to be an important component of urbanization as cities being the centres of manufacturing, services and trade, attract population from other areas. The findings of the study unfolded that migrants were mostly young, who shifted to improve their living conditions. While insufficient economic opportunities, low income, and limited educational facilities pushed them to migrate out, the opportunities in the cities acted as the pull-factors. A variety of such factors including those at the place of origin and destination were also brought out in the Indian context (Mitra and Murayama, 2009).

Table 1. Rural to urban migration rate (defined as the migrants of 0-9 years duration at the place of destination as

a percentage of total urban population in the districts, 2011).

Migration Rate	Number of Districts			Percent of Districts		
	Person	Males	Females	Person	Males	Females
< 3 percent	17	73	7	2.7	11.5	1.1
3.0 - 4.0 percent	32	69	8	5.0	10.8	1.3
4.1- 5.0 percent	54	65	27	8.5	10.2	4.2
5.1- 6.0 percent	69	84	41	10.8	13.2	6.4
6.1- 7.0 percent	71	75	54	11.1	11.8	8.5
7.1- 8.0 percent	81	74	64	12.7	11.6	10.0
8.1- 9.0 percent	83	39	62	13.0	6.1	9.7
9.1- 10.0 percent	54	37	75	8.5	5.8	11.8
10.1- 11.0 percent	46	31	80	7.2	4.9	12.6
11.1-12.0 percent	25	13	61	3.9	2.0	9.6
12.1- 13.0 percent	28	14	39	4.4	2.2	6.1
13.1- 14.0 percent	15	14	23	2.4	2.2	3.6
14.1- 15.0 percent	14	9	22	2.2	1.4	3.5
>15 percent	48	40	74	7.5	6.3	11.6
No of Districts	637	637	637	100		100
Minimum (%)	2.0	0.5	2.0			
Maximum (%)	48.9	55.4	56.6			

Note: There is no rural-urban migration in 3 districts; so the total number of districts is 637. Source: Population Census, 2011.

It may not be possible to capture the minute details of the population movement processes through secondary sources like population censuses or National Sample Survey (NSS) data, though these are the only sources of disaggregated level data at the country, state and district level. There are views that the secondary sources grossly underestimate the migrant population at the place of destination. For example, the floating population or the very short duration migrants are hardly captured by these sources. Srivastava (2020) argued that the estimates of migrants from the Census and the NSS both failed to satisfactorily measure seasonal/circular migrants. Nevertheless, the information available from the secondary sources can throw light on the broad patterns of population mobility and can at least provide clue for effective settlement and employment policies. The patterns can be delineated to understand the empirical validation of some of the theoretical underpinnings. For example, the literature on migration and agglomeration economies reinforced the fact that regions with large cities attract more migrant population as the job search costs are less there and the real earnings are relatively higher (Roca and Puga, 2016; Mills and Becker, 1986). Hence, from an empirical standpoint, we can assess on the basis of these data sources if higher incidences of migration exist in regions with large cities. though the possibility of different causal structure with similar outcomes cannot be ruled out. Similarly, an in-depth analysis has been carried out by Roca and Puga (2016) in explaining the higher earnings in bigger cities in terms of three reasons: spatial sorting of initially more productive workers, static advantages from workers' current location and learning by working in bigger cities.

Rural to urban migrants look for jobs in the urban labour market for which they use a great deal of informal networks developed along the lines of caste and kinship bonds and contacts through co-villagers, friends and so on. These networks are, in fact, inevitable for seeking an entry to the labour market though network concentration is seen to reduce the probability of upward mobility (Kono, 2006; Iverson et al., 2009). In other words, the lack of network diversification results into labour market information asymmetry which in turn reduces the upward mobility. Besides, the community networks also play a significant role in the context of migration, and its implications for inequality across and within communities are discussed by Munshi (2016). However, looking from the point of view of city growth and development the contributions made by the low income migrants are enormously rich. In fact, the value addition they create is much more than the income they are able to earn for themselves (Hayami et al., 2006). Hann, Brock and Caulibaly (2002) studied the patterns of migration in Mali and

they go on to show how the people have successfully used migration as a strategy for risk management as migration for work (domestic as well as across borders) is an integral part of households in Mali.

Since, it is the urban economy which holds prospects for job opportunities with higher productivity and wages, and contributes towards eradicating abject poverty (Wan and Lu, 2019; Mills and Becker, 1986), rural to urban migration is usually directed towards the large cities (Kundu, 2006). The job prospects are definitely better for the migrants in large cities than those in small towns. But these possibilities are closing down for the unskilled, illiterate population because the metropolitan cities are resisting immigration of unskilled and illiterate male population due to changes in the requirements in labour market. The newly emerging activities in the urban areas, even including those in the informal sector, are skill intensive which the unskilled labour from the rural areas cannot match. In spite of the fact that migration for employment from rural to urban areas is a major tool of poverty alleviation, the opportunities are gradually declining (Kundu and Mohanan, 2009). The study by Ghafoor et al. (2021) empirically investigates the heterogeneous socioeconomic impacts of agglomeration economies in selected cities of Punjab, Pakistan, from 1998 to 2018, using the Pooled Mean Group and the Mean Group techniques of Panel ARDL and notes unbridled clustering of population in emerging urban agglomerations, turning economies into diseconomies. Yang et al., (2022) developed an econometric panel model to quantitatively analyse the effect of the connection network on the economic growth of the urban agglomeration. They noted that the connections between cities are gradually getting strengthened; however, the regional differences are becoming obvious, showing a core–edge pattern of eastern agglomeration and western sparseness.

In the New Economic Geography (NEG) framework of industry location1 (Krugman, 1991; Dual et al., 2010), external-scale economies make people and companies more productive through the following mechanisms, as pointed out by Frick and Rodriguez-Pose (2018): (a) knowledge spill-overs between workers enabling learning and spur innovation; (b) forward and backward linkages between companies, suppliers, and buyers, making interactions between economic actors more efficient; and (c) a pooled labour market allowing for an easier matching between firms and employees. They indicate that a high share of industries, a well-developed urban infrastructure, and an adequate level of governance effectiveness allow countries to take advantage of agglomeration benefits from larger cities. Besides, the productivity impact of metropolitan governance structures is well documented by Ahrend et al. (2015). Mitra and Nagar (2018) constructed the city level wellbeing index for almost all cities and towns in India and presented evidence in favour of very large cities being endowed with better infrastructure and associated with higher living standards. On the whole, NEG provides a general equilibrium-based and micro-founded approach to modelling a spatial economy characterised by a large variety of economic agglomerations and it emphasises, as Chen and Peng (2020) pointed out, how agglomeration (centripetal) and dispersion (centrifugal) forces interact to generate observed spatial configurations and uneven distribution of economic activity.

The difference between the NEG literature and the urban economists' agglomeration approach is that the former analyses the impact of city size or agglomeration on economic growth at the national level, while the latter is concerned with the impact of city size on the productivity of urban workers at the city level though the mechanisms which determine people's productivity are similar (Castells-Quintana and Royuela, 2017). Criticizing the existing literature on static agglomeration economies, Camagni et al. (2016) abandon the agglomeration-growth shortcut and unravel the role of dynamic agglomeration economies and their determinants. The quality of the activities, the quality of production factors, the density of external linkages and co-operation networks, and the characteristics of the overall urban system in which the city is located are some of the major factors which are

[1] Though the modern sector in the historical sense was manufacturing, in the present context the services sector falls within its scope and firms in this sector not only supply to consumers and manufacturing firms but also serve each other (Ottaviano and Thisse, 2004).

expected to increase productivity and long-term 'structural dynamics' processes of urban transformation (Camagni et al., 2016).

To simplify, the urban agglomeration literature would suggest that all firms and all workers in general are more productive in large cities, while the NEG angle would insist that the better performers compared to their average counterparts would get better or benefit more in large cities. Hence, among the migrants the better performers may be presumed to have moved to the large cities. And if that is the case, the combination of higher levels of urbanization, higher migration rate and higher work participation rate is an expected outcome. Further, higher levels of urbanization are also expected to be associated with better outcomes from demographic and socio-economic angles. In the following sections we pursue our analysis in the light of these hypotheses. Some of the earlier studies (both agglomeration and NEG literature) offered theoretical explanations as to why large urban spaces may attract higher rates of migration though the empirical part was often missing. On the other hand, the empirical studies did not quite focus on the migration issues keeping in view the theoretical underpinnings. This study tries to fill in this gap.

3. Data and Methods

The analysis is carried out at a fairly disaggregated level - at the district level –using the population census 2011 data so that the detailed patterns are retrieved with greater insights. Due to the rapid spread of COVID-19 in India in 2021 the population census could not take place. Hence, the detailed migration data at the district level had to be analysed from 2011 census, which were released in 2019. Though the recent data are not available, given the cross-sectional nature of the study the policy insights can be deduced with a long-term perspective. This is because the districts at the lower margin would require enormous amount of time to catch up with the districts at the upper end.

The broad methodology we follow includes bivariate summary tables and factor/cluster analysis. We follow the factor analysis technique to focus on the association of variables. This helps identify groups of variables or factors which are statistically significant. Then within a given factor we examine the nature of association between different variables. This offers insights to comment on important correlates and draw policy insights.

In factor analysis each factor can be said to be a linear combination of a group of variables:

$$F(j) = \sum \beta(ij) X(i) + e(j)$$

$$j = 1 \dots k, \text{ and } i = 1 \dots n$$

Where F is the factor, X(i) is the ith variable and B(ij) is the factor loading corresponding to the variable X(i) in the jth factor and e a random error. It resembles the multiple regression model but the basic difference between them is that the factors are unobservable whereas in a multiple regression model we have the observed values on both dependent and independent variables. In factor analysis the factors are the hypothetical constructs which can be estimated only from the observed data on the variables Xs (Herman, 1967). The number of factors (k) chosen is usually less than the number of variables (i=1.2…. n) under consideration though the number of factors produced can be as many as the number of variables. In other words, only the significant factors i.e., the factors with eigen values or latent roots greater than 1, are taken into account. Eigen value is computed as the sum of the square of the factor loadings of all the variables on a given factor. Eigen value is a measure of the amount of variation accounted for by a factor. The proportion of the eigen value of a given factor to the sum of all the eigen values of the factors with positive eigen values gives the percentage of total variation captured. Though the input matrix for factor analysis is built on the basis of the correlation between the variables, the factor analysis enables to visualize the co-movement of a group of variables. The magnitude of the coefficient of a variable which is otherwise known as factor

loadings can vary between 0 and plus or minus unity. Closer the value to unity higher is the significance of the variable; on the other hand, closer to 0 means insignificance. The sign of the coefficient of a variable indicates the nature of its relationship with the other variables. If one has a positive and another a negative coefficient, it means an inverse relationship between the two. On the other hand, if both the variables have either positive or negative factor loadings, then the variation is seen to be occurring in the same direction.

4. Key Findings

Rural to urban migration that took place between 2001-2011 comprises only a small percentage of the urban population at the district level (Table 1). More than 60 percent of the districts reported a male migration rate of 8 per cent at the most. However, among the females the migration rates are much higher: more than 60 per cent of the districts registered a rate of more than 8 per cent at least. The geographical location of districts with different magnitudes of migration rates are portrayed in Map 1.

Secondly, if we estimate the decadal movement of population as a percentage of the total migrant population of all duration in the urban areas, the population movement phenomenon does not seem to be insignificant by any means. Nearly 90 per cent of the districts registered a figure of more than 30 per cent (Table 2). From this angle, the current migration seems to be substantial: the decadal male migrants as a percentage of all duration male migrant population turns out to be at least 40 per cent in around 40 per cent of the districts. Among the females the corresponding figure, however, seems to be much lower: only around 27 per cent of the districts show a figure of more than 40 per cent.

The migration pattern in comparison to the previous decade (1991-2001) does not seem to have undergone any major change over time. Migration rates defined in terms of the gross decadal inflow of population as a percentage of total population at the place of destination did not seem to be high in a large number of districts as seen from the 2001 census data (Mitra and Murayama, 2009). The intra-state rates were substantially larger than the inter-state rates. Secondly, the male and female migration rates were closely associated irrespective of whether they migrated from the rural areas within the state or outside the state. This would suggest that women usually migrate as accompanists of the males. Though many of the relatively poor and backward states actually showed large population mobility, which was primarily in search of a livelihood, the mobility of especially male population was also seen to be prominent in the relatively advanced states like Maharashtra and Gujarat. Rapid migration of rural females within the boundaries of the state was, however, evident across most of the regions: several of the south Indian states in addition to the north Indian states recorded a high migration rate of females.

Table 2. Rural to urban migration of 0-9 years duration as a percentage of rural to urban migration of all-duration, 2011.

% of all duration migrants	Number of Districts			Percent of Districts		
	Persons	Males	Females	Persons	Males	Females
< 30 percent	45	51	66	7.1	8.0	10.4
30- 35 percent	196	134	195	30.8	21.0	30.6
35.1- 40 percent	211	186	206	33.1	29.2	32.3
40.1- 45 percent	96	140	93	15.1	22.0	14.6
> 45 percent	89	126	77	14.0	19.8	12.1
No of Districts	637	637	637			
Minimum (%)	24.5	20.7	23.1			
Maximum (%)	89.3	88.6	90.2			

Note and Source: See Table 1.

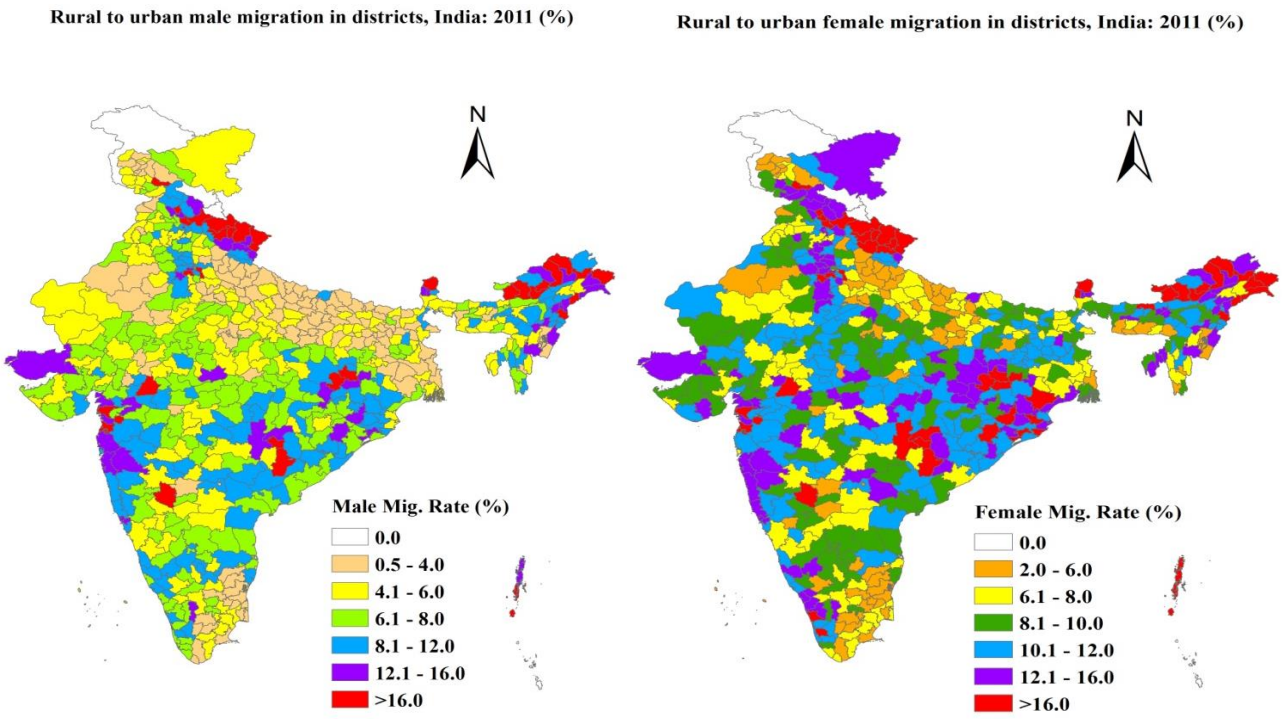

Figure 1. Rural to urban male and female migration rates during 2001-2011 at the district level (%).

Source: Figures are prepared by the authors.

Table 3. Districts across regions distributed by migration rate.

Regions	No. of districts	Very Low	Low	Moderate	High	Very High	Extremely High
		0.1-5	5.1-10	10.1-15	15.1-20	20.1-25	>25
Males							
North	131*	32 (24.4)	65 (49.6)	21 (16.0)	3 (2.3)	2 (1.5)	6 (4.6)
Central	139	70 (50.4)	56 (40.3)	7 (5.0)	5 (3.6)	0 (0.0)	1 (0.7)
East	111	53 (47.7)	46 (41.4)	9 (8.1)	3 (2.7)	0 (0.0)	0 (0.0)
North-East	86	14 (16.3)	42 (48.8)	17 (19.8)	8 (9.3)	4 (4.7)	1 (1.2)
West	66	7 (10.6)	36 (54.5)	17 (25.8)	2 (3.0)	1 (1.5)	3 (4.5)
South	107**	31 (29.0)	64 (59.8)	10 (9.3)	1 (0.9)	0 (0.0)	0 (0.0)
Total Dist	640	207 (32.3)	309 (48.3)	81 (12.7)	22 (3.4)	7 (1.1)	11 (1.7)
Females							
North	131*	7 (5.3)	50 (38.2)	52 (39.7)	12 (9.2)	3 (2.3)	5 (3.8)
Central	139	17 (12.2)	75 (54.0)	38 (27.3)	6 (4.3)	2 (1.4)	1 (0.7)
East	111	2 (1.8)	48 (43.2)	48 (43.2)	13(11.7)	0 (0.0)	0 (0.0)
North-East	86	7 (8.1)	29 (33.7)	28 (32.6)	15(17.4)	6 (7.0)	1 (1.2)
West	66	1 (1.5)	25 (37.9)	34 (51.5)	2 (3.0)	2 (3.0)	2 (3.0)
South	107**	8 (7.5)	69 (64.5)	25 (23.4)	3 (2.8)	1 (0.9)	0 (0.0)
Total Dist	640	42 (6.6)	296 (46.3)	225 (35.2)	51 (8.0)	14 (2.2)	9 (1.4)

*Note: * No urban Population in Kinnaur and Lahul & Spiti district in north region, **No Urban Population in Nicobar district in south region. Figures in parentheses are percentages relative to the row total. Source: Population Census, 2011.*

The distribution of districts as per migration rates in different geographic regions (see Table A1 in Appendix 1, for formation of regions) seems to be different between the males and the females. Even among the males; the central and eastern regions, for example, comprise nearly 90 per cent of the districts with very low/ low migration rates (Table 3), a pattern which is quite different from the other regions where districts with higher rates of

migration are perceivable. Similarly, among the females nearly 70 per cent of the south and central region districts are characterised in terms of very low/low migration rates while in other regions the percentage of districts with higher rates of migration is not all that insignificant. On the whole, the regional variations in the context of migration are noteworthy: north-east, for example, is an exception: a very high percentage of districts show very high rates of migration.

Table 4. Districts distributed by urbanization rate.

Region	No. of districts	Very Low	Low	Moderate	High	Very High	Extremely High
		<10.0	10.1-20.0	20.1-40.0	40.1-60.0	60.1-80.0	>80.0
North	131*	22 (16.8)	37 (28.2)	43 (32.8)	13 (9.9)	3 (2.3)	11 (8.4)
Central	139	24 (17.3)	57 (41.0)	46 (33.1)	6 (4.3)	5 (3.6)	1 (0.7)
East	111	51 (45.9)	37 (33.3)	13 (11.7)	8 (7.2)	1 (0.9)	1 (0.9)
North-East	86	23 (26.7)	34 (39.5)	16 (18.6)	10 (11.6)	2 (2.3)	1 (1.2)
West	66	2 (3.0)	17 (25.8)	27 (40.9)	10 (15.2)	6 (9.1)	4 (6.1)
South	107**	3 (2.8)	16 (15.0)	47 (43.9)	22 (20.6)	12(11.2)	6 (5.6)
Total Dist	640	125 (19.5)	198 (30.9)	192 (30.0)	69 (10.8)	29 (4.5)	24 (3.8)

*Note: * No urban Population in Kinnaur and Lahul & Spiti district in north region, **No Urban Population in Nicobar district in south region. Figures in parentheses are percentages relative to the row total. Source: Population Census, 2011.*

Table 5. Districts distributed by urbanization rate and migration rate, 2011 (in number and percentage).

	Urbanization Rate	No. of districts	Migration Rate					
			0.1-5	5.1-10	10.1-15	15.1-20	20.1-25	>25.1
Male								
Very Low	<10.0	129 (20.2)	53 (8.3)	48 (7.5)	16 (2.5)	5 (0.8)	1 (0.2)	3 (0.5)
Low	10.1-20.0	197 (30.8)	58 (9.1)	98 (15.3)	24 (3.8)	10 (1.6)	2 (0.3)	5 (0.8)
Moderate	20.1-40.0	192 (30.0)	60 (9.4)	107 (16.7)	18 (2.8)	3 (0.5)	4 (0.6)	0 (0.0)
High	40.1-60.0	69 (10.8)	25 (3.9)	29 (4.5)	11 (1.7)	3 (0.5)	0 (0.0)	1 (0.2)
Very High	60.1-80.0	29 (4.5)	5 (0.8)	14 (2.2)	8 (1.3)	1 (0.2)	0 (0.0)	1 (0.2)
Extremely High	>80.0	24 (3.8)	6 (0.9)	12 (1.9)	5 (0.8)	0 (0.0)	0 (0.0)	1 (0.2)
Total Dist		640 (100)	207 (32.3)	308 (48.1)	82 (12.8)	22 (3.4)	7 (1.1)	11 (1.7)
Female								
Very Low	<10.0	129 (20.2)	6 (0.9)	50 (7.8)	47 (7.3)	17 (2.7)	3 (0.5)	3 (0.5)
Low	10.1-20.0	197 (30.8)	10 (1.6)	82 (12.8)	76 (11.9)	20 (3.1)	5 (0.8)	4 (0.6)
Moderate	20.1-40.0	192 (30.0)	11 (1.7)	99 (15.5)	69 (10.8)	8 (1.3)	5 (0.8)	0 (0.0)
High	40.1-60.0	69 (10.8)	7 (1.1)	40 (6.3)	17 (2.7)	4 (0.6)	0 (0.0)	1 (0.2)
Very High	60.1-80.0	29 (4.5)	3 (0.5)	11 (1.7)	12 (1.9)	2 (0.3)	0 (0.0)	1 (0.2)
Extremely High	>80.0	24 (3.8)	5 (0.8)	14 (2.2)	4 (0.6)	0 (0.0)	0 (0.0)	1 (0.2)
Total Dist		640 (100)	42 (6.6)	296 (46.3)	225 (35.2)	51 (8.0)	13 (2.0)	10 (1.6)

Note: Percentage in parentheses is relative to the total number of 640 districts. Source: Population Census, 2011.

At higher levels of urbanization though it is difficult to trace districts with very high levels of rural to urban migration either among the males or the females (Table 5), it is still evident that even at higher levels of urbanization migrants are attracted from the rural areas. In other words, instead of leading to a saturation point, districts with higher levels of urbanization are able to draw migrants at a low pace. At relatively lower levels of urbanization there are clusters of districts with low and moderate rates of migration and, also, with high rates of population movement. In other words, the migration rate is quite varied, indicating that rural to urban mobility contributes to urban growth in such districts even when urban dynamism may not be present. The lack of livelihood opportunities in the

rural areas can be seen as a driving force in these districts. On the whole, we are able to observe that higher urbanization levels still attract migration and secondly, with lower levels of urbanization, migration is not necessarily insignificant. In the following section we examine our hypothesis quantitatively.

4.1. Association among the variables in the urban context

In order to understand the association among different variables we have pursued factor analysis as mentioned in the preceding section. . In the urban context we have considered the urbanization level, migration rate for males and females, sex ratio, share of 0-6 years population, child sex ratio, child- women ratio, share of SC population, share of ST population, literacy rate for males and females, work participation rate for males and females, males and female workers engaged in manufacturing household industries, non-household manufacturing industries, construction works, and services. In the rural context, in addition to these variables we have considered males and females engaged as cultivators, agricultural labourers and those in forestry.

Six factors turn out to be statistically significant each with an Eigen value of greater than unity though the significance of factor 1 supersedes the others considerably. In the light of our hypothesis, we are able to note that there is a positive relationship between urbanization level and the male migration rate (F-1). Of course, the association is not strong as the factor loadings corresponding to both the variables are 0.33 and 0.16 respectively. This means that there is a cluster of districts where higher levels of urbanization reduce the rate of migration (F-4). However, the cluster with districts, where higher levels of urbanization are associated with higher migration rates is dominant. Thus, on the whole, we are still able to observe positive factor loadings for both the variables though the magnitudes due to the neutralisation effects are low/moderate (F-1).

These findings offer clue to the theoretical underpinnings that the districts with higher levels of urbanization comprise more productive opportunities and hence, are able to draw population from the rural areas at higher rates. The urban space in these districts appears to be profitable (in spite of overcrowding) to those who are possibly endowed better with human capital. The better performers are able to recognise the potentiality that the large urban spaces offer and hence, they flow on a large scale from the rural areas with the hope of getting better off. The NEG angle is in a sense underlying these findings though it is equally true that not all highly urbanized districts are associated with higher migration rates. Over-exhaustion of scope in the urban space, diseconomies and the absence of better performers to locate and utilise the potentiality of the large urban spaces are some of the reasons which may explain the absence of a strong positive association between the urbanization level and the migration rate.

The positive factor loadings corresponding to the literacy rates further substantiate the NEG line of rationalisation as better human capital is likely to get much better off in large urban spaces (F-1). The key evidence in this respect relates to the male work participation rate which corresponds to positive factor loadings the magnitude of which is on the high side. In other words, higher urbanization levels being associated with greater work opportunities, even in relative sense, are very much reflected in the findings which tend to conform to the NEG angle. Activities like services and construction also take positive factor loadings, indicating that they comprise productive opportunities from the livelihood point of view. On the other hand, household manufacturing takes negative factor loadings implying that own account enterprises are less likely to offer productive opportunities; hence, with higher urbanization workers shift from these stagnant activities as better outlets may be emerging. Non-manufacturing take negligible factor loadings as industries from the urban space are almost disappearing due to regulations and other constraints. The source of agglomeration economies now seems to be originating from the service hubs.

Finally, the association between male and female migration rates, though, does not turn out to be significant (F-1), there is a cluster of districts where both the rates are strongly associated. The number of such districts may be small as a result of which the significance of the relationship between the variables is evident only in factor 4,

that is, statistically less prominent. Females possibly accompany the males in the districts belonging to this cluster which result in a strong positive relationship between both the rates. This could also be the reason why the sex ratio does not deteriorate with rising urbanization; rather it shows a positive association in factor 1.

Interestingly, some of the demographic transitions also seem to be in progress along with urbanization. The share of population in the 0-6 years age bracket, which represents fertility broadly speaking, declines with increase in urbanization. The migrants are also seen to follow the small family norm after they move into the urban space. The child-sex improves, marginally though, suggesting a mild tendency of erosion of the sex biases of the parents. The scheduled caste population share is positively associated with urbanization and migration, indirectly indicating that they may have moved from the rural areas to the more urbanized areas in order to take advantage of the prospects. Overall, the findings are suggestive of positive spill-over effects of urbanization, though they are extremely weak as seen from the magnitude of the factor loadings.

Table 6. Rotated factor loadings on selected variables in urban areas (N=637).

Variables	F-1	F-2	F-3	F-4	F-5	F-6
Urb_rate	0.326	0.558	0.029	-0.185	-0.332	-0.143
MigRate_M	0.160	0.098	0.180	0.890	-0.163	0.039
MigRate_F	0.088	-0.099	0.043	0.924	-0.062	0.157
Sex_Ratio	0.210	0.052	0.306	-0.537	0.110	0.526
Share_06 pop	-0.947	-0.049	0.121	-0.040	0.021	-0.063
CSR	0.141	-0.052	0.654	-0.149	0.125	0.387
SC_share	0.171	0.033	-0.682	-0.121	0.232	0.171
ST_share	-0.102	-0.250	0.796	0.199	-0.177	-0.039
Litrate_M	0.856	-0.053	0.163	0.148	-0.195	0.023
Litrate_F	0.822	-0.025	0.247	0.053	-0.224	0.055
WPR_M	0.659	0.380	-0.018	0.236	0.020	-0.062
WPR_F	0.290	0.047	0.763	0.074	0.223	-0.015
CWR	-0.931	-0.016	0.058	0.020	-0.007	-0.133
HHE_M	-0.134	0.035	-0.146	-0.161	0.784	-0.160
HHE_F	-0.096	0.121	0.002	-0.153	0.854	-0.045
NonHHE_M	0.075	0.873	-0.212	0.095	-0.005	-0.071
NonHHE_F	0.092	0.844	-0.023	-0.049	0.189	0.047
Const_M	0.123	0.070	-0.045	0.141	-0.083	0.776
Const_F	0.137	-0.025	-0.071	0.287	-0.097	0.719
Service_M	0.284	-0.670	-0.038	0.092	-0.337	-0.294
Service_F	0.251	-0.427	-0.283	0.050	-0.586	-0.320
Eigen Value	4.153	2.678	2.497	2.307	2.244	1.877
% Explained	0.198	0.128	0.119	0.110	0.107	0.089

Note: For the description of the variables see Table A3 in Appendix 3. Source: Based on Population Census, 2011.

The regression results (Table 7 and Table 8) also indicative of a negative association between the urbanization rate and the migration rate, suggesting that migrants not necessarily move to districts which are highly urbanized. Though there could be exceptions in the case of very large cities, by and large the urbanization is not seen to be a driver of further population from the rural areas. In this sense, at the aggregate level the NEG framework does not get substantiated with evidence. However, as we have noted in the light of the factor analysis results, there are certain districts where the positive association between migration and urbanization is discernible. In fact, the lack of positive association can be taken as an input for deriving policy insight: the full potential of urbanization has not been realised in many of the districts; hence, consecrated efforts will have to made to take advantage of the capacity that has already been created.

Table 7. Regression results for male migration in Urban India.

MIGMales	Coef.	t	P>t
Urb_rate	-0.037	-4.200	0.000
Sex_Ratio	-0.034	-9.210	0.000
Share_06 pop	2.752	6.540	0.000
CSR	-0.004	-0.910	0.364
SC_share	-0.093	-3.200	0.001
ST_share	0.048	4.130	0.000
Litrate_M	0.320	6.940	0.000
WPR_M	0.108	2.090	0.037
CWR_U	-0.076	-6.620	0.000
HHE_M	-0.251	-3.840	0.000
NonHHE_M	0.165	5.390	0.000
Const_M	0.337	7.880	0.000
Service_M	-0.017	-0.690	0.488
Constant	0.744	0.100	0.922

Note: Number of Observations: 637, Adjusted R2 = 0.424 and F=36.98 which is significant at 1 per cent level.

Table 8. Regression results for female migration in Urban India.

MIGFemales	Coef.	t	P>t
Urb_rate	-0.065	-7.420	0.000
Sex_Ratio	-0.035	-10.090	0.000
Share_06 pop	1.439	3.720	0.000
CSR	-0.003	-0.620	0.537
SC_share	-0.058	-1.980	0.049
ST_share	-0.013	-1.000	0.316
Litrate_F	0.269	8.170	0.000
WPR_F	0.057	1.500	0.134
CWR_U	-0.036	-3.250	0.001
HHE_F	-0.085	-3.120	0.002
NonHHE_F	0.042	1.420	0.155
Const_F	0.333	7.500	0.000
Service_F	-0.035	-1.980	0.048
Constant	23.160	4.290	0.000

Note: Number of Observations: 637, Adjusted R2 = 0.35 and F=27.05 which is significant at 1 per cent level.

4.2. Association among the variables in the rural context

The factor analysis has also been conducted on the urbanization level, migration rate and a wide range of rural specific variables of the districts mentioned in the previous section. The rural migrants may have come from the rural areas of the same district and also from the other districts of the same state or other states. This is one rationale why we try to reflect on the background of some of the rural migrants, if not all. However, from another angle the wide-reaching effects of urbanization on the rest of the rural areas are of primary concern. With improved levels of urbanization how the rest of the district behaves is a key question for assessing the quality of urbanization. Whether the rural profile undergoes a significant transformation with an increase in urbanization is the central issue. From Table 9 it may again be confirmed (F-1) that both urbanization and the migration rates, particularly among the males, are positively associated though the extent of relationship is low. The work force participation rate, especially among the males, is also correlated positively.

Some of the traditional activities like cultivation, decline and non-household manufacturing and services in the rural areas rise in response to increasing urbanization. Literacy too improves though the child sex ratio in the rural areas actually declines, indicating no positive impact on social transformation. The aggregate sex ratio rises but that

could be because of the outgoing male population from the rural areas. On the whole, at least on some of the aspects, increased urbanization is seen to generate beneficial impact. At least, in terms of labour market indicators and the structure of employment, urbanization is able to bring in changes in the adjoining rural areas. Some of the urban activities shift to the rural space in an attempt to reduce cost and the rural transformation becomes evident. On the other hand, rural land use pattern changes remarkably as the land price increases with improved urbanization within the district.

Table 9. Rotated factor loadings on selected variables in rural areas (N=628).

Variables	F-1	F-2	F-3	F-4	F-5	F-6	F-7	F-8	F-9
Urb_rate	0.329	0.051	-0.139	0.003	0.167	0.747	-0.174	-0.143	-0.049
MigRate_M	0.121	0.195	0.086	0.138	0.009	0.153	0.914	-0.127	-0.033
MigRate_F	0.044	0.146	0.042	0.067	0.087	-0.092	0.950	-0.073	-0.027
Sex_Ratio	0.407	-0.104	0.207	0.507	0.107	-0.359	0.047	0.244	0.046
Share_06 pop	-0.906	0.111	-0.118	0.138	-0.160	-0.137	-0.063	-0.046	-0.074
CSR	-0.031	-0.247	0.247	0.734	0.166	-0.190	0.098	0.138	0.093
SC_share	0.201	-0.270	0.065	-0.776	0.071	-0.075	-0.146	0.160	-0.029
ST_share	-0.189	0.335	0.259	0.663	-0.051	-0.002	0.184	-0.217	-0.171
Litrate_M	0.869	0.114	-0.240	-0.092	-0.010	0.098	0.033	-0.034	0.066
Litrate_F	0.852	0.123	-0.286	0.089	0.015	0.120	0.030	-0.040	0.118
WPR_M	0.572	-0.219	0.542	0.088	0.078	0.263	0.093	-0.072	0.055
WPR_F	0.142	0.086	0.768	0.339	-0.039	-0.149	0.147	-0.132	-0.187
CWR	-0.906	0.053	-0.127	0.068	-0.166	-0.104	-0.073	-0.065	-0.075
Cul_M	-0.318	0.462	0.510	-0.023	-0.398	-0.318	0.036	-0.162	-0.142
Cul_F	-0.154	0.682	0.417	0.112	-0.173	-0.267	0.183	-0.241	-0.258
AgL_M	-0.077	-0.918	0.086	-0.073	-0.199	-0.060	-0.164	0.008	-0.128
AgL_F	0.006	-0.914	0.228	-0.011	-0.127	-0.050	-0.134	-0.083	-0.170
For_M	0.221	0.068	-0.079	0.243	0.208	0.041	-0.085	0.026	0.809
For_F	0.094	0.135	-0.087	-0.168	0.019	0.013	-0.001	-0.077	0.883
HHE_M	0.025	-0.043	-0.207	-0.131	0.055	0.016	-0.160	0.790	-0.146
HHE_F	-0.029	0.017	-0.051	0.025	-0.012	0.174	-0.154	0.814	0.045
NonHHE_M	0.246	-0.042	-0.148	-0.190	0.157	0.727	0.220	0.223	0.026
NonHHE_F	0.199	0.002	-0.153	0.007	0.185	0.690	0.097	0.364	0.140
Const_M	0.193	0.195	-0.207	-0.070	0.855	0.108	0.044	0.107	0.089
Const_F	0.075	0.075	-0.102	0.092	0.895	0.138	0.074	-0.056	0.090
Service_M	0.271	0.392	-0.625	0.118	0.350	0.175	0.103	0.002	-0.038
Service_F	0.103	0.183	-0.836	-0.087	0.241	0.139	-0.074	0.099	0.056
Eigen Value	4.253	3.031	2.998	2.217	2.206	2.201	2.093	1.814	1.742
% Explained	0.158	0.112	0.111	0.082	0.082	0.082	0.078	0.067	0.065

Note: For the description of the variables see Table A3 in Appendix 3. Source: Based on Population Census, 2011.

Considering the rural specific variables, we are not able to observe a strong positive association between urbanization and population movement (Table 10 and Table 11). In other words, districts with higher levels of urbanization do not show a high rate of male or female migration in the rural areas. If we are expecting the rural areas of the urbanized districts to be dynamic and vibrant in attracting migrants from the other districts of the same state and other states, such patterns are not strongly discernible. But the negative association in such districts can be rationalised in a different manner. The potential rural migrants would usually look for opportunities in the urban areas instead of the rural areas. When the urban areas grow in a district, they are likely to attract the migrants from the rural areas instead of the rural areas of the urbanized districts being the drivers of migration. In fact, the rural areas of the urbanizing/urbanized districts shrink significantly, undergoing changes in land utilisation patterns.

Table 10. Regression results for male migration in Rural India.

MIGMales	Coef.	t	P>t
Urb_rate	-0.050	-4.390	0.000
Sex_Ratio	-0.002	-0.470	0.635
Share_06Pop	-0.293	-0.710	0.480
CSR	0.010	1.710	0.088
SC_share	-0.042	-1.800	0.073
ST_share	0.046	4.890	0.000
Litrate_M	0.018	0.620	0.533
WPR_M	0.030	0.540	0.590
CWR_R	0.000	0.000	0.997
Cul_M	-0.031	-1.480	0.140
AgL_M	-0.114	-5.170	0.000
For_M	-0.157	-3.920	0.000
HHE_M	-1.187	-7.590	0.000
NonHHE_M	0.428	8.260	0.000
Const_M	-0.124	-1.910	0.056
Constant	7.945	1.200	0.232

Note: Number of Observations: 628, Adjusted R2 = 0.40 and F=26.73 which is significant at 1 per cent level.

Table 11. Regression results for female migration in Rural India.

MIGFemales	Coef.	t	P>t
Urb_rate	-0.068	-6.010	0.000
Sex_Ratio	-0.008	-1.810	0.071
Share_06Pop	-0.401	-0.950	0.343
CSR	0.003	0.520	0.606
SC_share	-0.059	-2.600	0.009
ST_share	0.014	1.470	0.142
Litrate_F	0.014	0.610	0.539
WPR_F	0.019	0.320	0.747
CWR_R	0.002	0.160	0.872
Cul_F	0.071	4.090	0.000
AgL_F	0.000	-0.030	0.979
For_F	0.012	0.450	0.656
HHE_F	-0.078	-2.030	0.043
NonHHE_F	0.159	3.330	0.001
Const_F	0.432	4.520	0.000
Constant	17.531	2.820	0.005

Note: Number of Observations: 628, Adjusted R2 = 0.24 and F=14.04 which is significant at 1 per cent level.

4.3. Regional variations among the variables in the urban context

As we tried to address the regional variations in the relationship among the variables by conducting the factor analysis at the regional level (districts being grouped into regional categories), sharp differences are noted across regions (Table A2.1 to Table A2.6 in Appendix 2). In the western region, for example, urbanization level, and male and female migration rates both are quite strongly associated in comparison to all other regions. However, it is non-household manufacturing which takes significant factor loadings instead of services. In other words, in the western region industry plays a major role in generating the agglomeration benefits in response to which migration takes place to the highly urbanized spaces. Such pattern of development, however, does not result in any improvement in the sex ratio as more males compared to females may be migrating to the relatively more urbanized areas in order to seek employment in the industry. In fact, the male literacy takes a low magnitude of factor loading while female literacy is almost insignificant. Again, it is the male work participation rate which improves with a rise in

urbanization level and migration.

In the districts in the northern region, the positive association between urbanization level and migration is moderate while in the central region the variables are almost unrelated. In eastern and southern regions urbanization unravels a moderate association in relation to male migration only. On the other hand, north-east districts are characterised in terms of rapid population mobility without any correspondence to the urbanization levels. In relation to work participation rates, literacy and activities considerable variations are evident across regions. On the whole, the role of geography is pertinent in shaping the level and type of urbanization and the population mobility from the rural to the urban areas.

5. Concluding Remarks

Keeping in view the concept of agglomeration economies and the NEG angle this paper made an attempt to analyse the rural to urban population movement at the district level. The decadal flow (2001-2011) constitutes a significant proportion of the all-duration migrants though as a percentage of the total urban population it is moderate.

The overall findings tend to indicate that higher levels of urbanization and higher migration rates are not strongly associated. However, there exists a cluster of districts which is able to attract migrants on a large scale in spite of being already urbanized. In other words, some of the large urban spaces can draw population from the rural areas at a rapid pace, substantiating with evidence the relevance of the agglomeration literature (Wan and Lu, 2019; Mills and Becker, 1986), especially the question as to why rural to urban migration is usually directed towards the large cities (Kundu, 2006), and the New Economic Geography (NEG) framework of industry location[2] (Krugman, 1991; Dual et al., 2010) and external-scale economies, making people and companies more productive in large urban spaces. Some of the variables such as work participation rate, share of services and construction and literacy rate all form parts of this positive nexus, indicating that opportunities exist with increased levels of urbanization which prompt people to migrate. However, it is important to mention that only those who have the confidence of mitigating the adverse effect of large population bases at the place of destination and are able to take advantages of concentration, will be migrating to such spaces. Instead of shifting to the districts which are less urbanized migrants decided otherwise. This brings to the fore that lower levels of urbanization are not endowed with benefits though lower population bases may be reducing the adversity associated with concentration.

Findings also suggest that the positive spill-over effects of higher levels of urbanization are not limited to the urban spaces only. The adjoining rural areas (rural-urban fringe) are also indicative of a significant transformation process. The land use pattern and activities seem to be changing and some of the developmental impact is evident though social transformation is yet to be achieved in these areas. However, in the urban areas of the highly urbanized districts both the social and economic changes are evident.

The rural areas of the highly urbanized districts do not seem to be associated with rapid migration flow. But this can be rationalised on the ground that the potential migrants usually look forward to the opportunities available in the urban spaces. There is no incentive for them to move to the rural areas of the urbanized districts as the rural spaces are on the verge of shrinking, undergoing shifts in land utilisation patterns.

On the negative side the findings also verify that there are many districts which in spite of being highly urbanized are not able to attract migrants at a rapid pace. The regional variations following from the factor analysis results bring out sharp differences in the relationship between urbanization level and migration rates, and variations in the determinants of the nature of urbanization and also certain outcome variables. The role of

[2] Though the modern sector in the historical sense was manufacturing, in the present context the services sector falls within its scope and firms in this sector not only supply to consumers and manufacturing firms but also serve each other (Ottaviano and Thisse, 2004).

geography is pertinent in shaping the level and type of urbanization and the population mobility from the rural to the urban areas. Policies which are able to address such regional differences carry a great degree of relevance.

Mere concentration of population does not seem to have resulted from economic opportunities in some of the districts. The potential migrants are aware of such lacuna and thus, respond rationally by not migrating at a rapid pace to these districts. Individuals who are endowed with higher human capital and efficiency drop out from such migration streams, which keep the migration rates low. One policy implication is that the governments including the local authorities are expected to make these spaces economically profitable, taking the advantages of population concentration. On the whole, new investment opportunities are to be created in such spaces in order to create the benefits of agglomeration economies. Greater investments in such spaces can reduce the cost of growth and make employment creation more effective, facilitating the rural population to take the benefits of agglomeration economies and get absorbed productively.

One of the major shortcomings of the study is that it could not pursue the analysis using more recent data, as the 2021 population census could not be carried out because of the pandemic. Secondly, such studies in the light of agglomeration and NEG literature should have been done in reference to different groups of manufacturing activities. However, due to the lack of data such an approach could not be initiated. Nevertheless, the study has been successful in unravelling some of the hidden facts in this context.

Funding Statement

This research received no external funding.

Acknowledgment

Acknowledgments to anonymous referees' comments and editor's effort.

Declaration of Competing Interest

All the authors claim that the manuscript is completely original. The authors also declare no conflict of interest.

Appendix

Table A1. States categorised into Regions (NFHS criteria followed to categorise states into Region).

Sl. No	States/UTs	Regions
1	Chandigarh	North
2	Delhi	
3	Haryana	
4	Himachal Pradesh	
5	Jammu & Kashmir	
6	Punjab	
7	Rajasthan	
8	Uttarakhand	
9	Chhattisgarh	Central
10	Madhya Pradesh	
11	Uttar Pradesh	
12	Bihar	East
13	Jharkhand	
14	Odisha	
15	West Bengal	

16	Arunachal Pradesh	Northeast
17	Assam	
18	Manipur	
19	Meghalaya	
20	Mizoram	
21	Nagaland	
22	Sikkim	
23	Tripura	
24	Dadra & Nagar haveli	West
25	Daman	
26	Goa	
27	Gujarat	
28	Maharashtra	
29	Andaman & Nicobar Islands	South
30	Andhra	
31	Karnataka	
32	Kerala	
33	Lakshadweep	
34	Puducherry	
35	Tamil Nadu	
36	Telangana	

Table A2.1. Rotated factor analysis results for northern region.

North (N=129)	F-1	F-2	F-3	F-4	F-5	F-6
Urb_rate	0.249	0.477	-0.168	-0.323	-0.117	-0.349
MigRate_M	0.271	0.008	-0.052	0.901	-0.070	-0.083
MigRate_F	0.218	-0.152	-0.029	0.931	-0.066	0.088
Sex_Ratio	0.037	0.186	-0.541	-0.158	0.532	0.373
Share_06 pop	-0.926	0.110	-0.185	-0.074	0.135	0.072
CSR	0.095	0.057	0.657	-0.362	0.144	0.154
SC_share	0.482	0.251	-0.381	-0.051	-0.014	0.499
ST_share	0.046	-0.212	0.807	-0.022	-0.047	0.028
Litrate_M	0.722	-0.143	0.244	0.394	-0.229	-0.062
Litrate_F	0.863	0.011	-0.104	0.340	-0.197	-0.122
WPR_M	0.448	0.144	0.594	-0.141	-0.298	-0.243
WPR_F	0.185	-0.209	0.539	0.230	0.365	-0.372
CWR	-0.950	0.000	-0.022	-0.117	-0.066	-0.046
HHE_M	-0.076	0.410	-0.191	-0.142	0.713	0.048
HHE_F	-0.290	0.093	0.095	-0.161	0.773	0.172
NonHHE_M	0.048	0.937	-0.098	-0.059	0.054	0.098
NonHHE_F	-0.207	0.785	0.063	-0.062	0.275	0.142
Const_M	-0.030	0.041	-0.290	-0.034	0.255	0.717
Const_F	-0.098	0.269	0.142	0.054	0.128	0.759
Service_M	0.190	-0.645	0.266	0.128	-0.347	-0.429
Service_F	0.424	-0.299	-0.122	-0.106	-0.568	-0.493
Eigen Value	4.050	2.744	2.549	2.390	2.375	2.352
% Explained	0.193	0.131	0.121	0.114	0.113	0.112

Source: Based on Population Census, 2011.

Table A2.2. Rotated factor analysis results for central region.

Central (N=139)	F-1	F-2	F-3	F-4	F-5	F-6
Urb_rate	0.297	-0.039	-0.353	-0.131	0.228	0.635
MigRate_M	0.098	0.961	0.034	-0.109	0.074	-0.027

MigRate_F	0.060	0.944	0.059	-0.013	0.109	-0.173
Sex_Ratio	0.250	0.175	0.843	0.114	0.044	-0.085
Share_06 pop	-0.911	0.041	-0.068	0.226	-0.061	-0.034
CSR	0.071	0.121	0.901	0.094	0.001	-0.097
SC_share	0.155	-0.107	-0.551	0.312	0.572	-0.010
ST_share	0.140	0.813	0.381	-0.114	-0.065	-0.109
Litrate_M	0.829	0.304	0.039	0.080	0.253	-0.143
Litrate_F	0.908	0.160	0.079	0.025	0.129	-0.037
WPR_M	0.383	0.388	0.371	-0.030	0.409	0.468
WPR_F	0.387	0.502	0.450	0.401	0.147	0.033
CWR	-0.903	-0.021	-0.133	0.228	0.031	0.016
HHE_M	-0.073	-0.274	0.025	0.702	-0.439	-0.009
HHE_F	-0.155	-0.186	-0.013	0.824	-0.192	0.064
NonHHE_M	-0.172	-0.212	-0.065	0.073	-0.160	0.831
NonHHE_F	-0.159	-0.158	-0.054	0.265	0.084	0.793
Const_M	0.094	0.024	-0.053	-0.109	0.867	0.067
Const_F	0.299	0.339	0.257	-0.155	0.669	-0.102
Service_M	0.541	0.244	0.015	-0.540	0.037	-0.313
Service_F	0.212	-0.190	-0.274	-0.763	-0.296	-0.157
Eigen Value	4.187	3.446	2.622	2.589	2.227	2.166
% Explained	0.199	0.164	0.125	0.123	0.106	0.103

Source: Based on Population Census, 2011.

Table A2.3. Rotated factor analysis results for eastern region.

East (N=111)	F-1	F-2	F-3	F-4	F-5	F-6
Urb_rate	0.465	-0.282	-0.057	-0.063	0.596	-0.192
MigRate_M	0.283	0.919	-0.084	0.017	0.008	-0.025
MigRate_F	0.044	0.910	0.006	-0.128	-0.152	0.087
Sex_Ratio	0.467	0.219	0.108	0.685	-0.035	0.213
Share_06 pop	-0.955	-0.060	-0.016	-0.141	-0.117	-0.154
CSR	-0.055	-0.143	0.053	0.850	-0.023	-0.033
SC_share	0.305	-0.130	0.068	0.199	-0.231	0.777
ST_share	0.155	0.779	-0.159	0.310	0.040	-0.234
Litrate_M	0.931	0.234	-0.074	-0.052	0.044	0.082
Litrate_F	0.945	0.181	0.009	-0.023	0.095	-0.044
WPR_M	0.698	-0.019	0.123	0.341	0.264	0.414
WPR_F	0.222	0.158	0.426	0.692	0.026	0.226
CWR	-0.948	-0.141	-0.013	-0.154	-0.131	-0.138
HHE_M	0.110	-0.158	0.886	-0.012	-0.065	0.003
HHE_F	-0.078	-0.114	0.902	0.197	0.073	0.025
NonHHE_M	0.242	-0.023	-0.005	-0.074	0.844	-0.009
NonHHE_F	0.020	0.013	0.320	0.333	0.617	-0.099
Const_M	0.142	0.286	0.178	-0.044	0.423	0.502
Const_F	0.223	0.592	-0.207	-0.006	0.398	0.441
Service_M	0.548	0.114	-0.330	0.139	-0.349	-0.241
Service_F	0.594	-0.145	-0.577	-0.262	-0.266	-0.191
Eigen Value	5.542	3.085	2.475	2.234	2.178	1.575
% Explained	0.264	0.147	0.118	0.106	0.104	0.075

Table A2.4. Rotated factor analysis results for north-eastern region.

North-East (N=86)	F-1	F-2	F-3	F-4	F-5	F-6
Urb_rate	-0.044	-0.610	0.236	0.397	-0.100	0.193
MigRate_M	0.835	-0.253	-0.236	-0.175	-0.089	-0.102
MigRate_F	0.866	-0.039	-0.108	-0.117	-0.092	-0.338
Sex_Ratio	-0.326	0.142	0.200	0.066	0.099	0.829

Share_06 pop	-0.179	-0.324	-0.280	-0.640	0.391	0.384
CSR	0.430	-0.087	-0.166	0.102	0.447	-0.030
SC_share	-0.126	0.782	0.258	0.220	-0.003	-0.059
ST_share	-0.006	-0.666	-0.476	-0.160	0.370	0.227
Litrate_M	-0.207	0.029	0.007	0.919	-0.125	-0.181
Litrate_F	-0.042	0.041	-0.131	0.915	0.112	0.191
WPR_M	0.095	0.320	0.231	0.299	-0.041	-0.753
WPR_F	-0.167	-0.680	0.097	-0.061	0.436	-0.035
CWR	-0.072	-0.301	-0.312	-0.621	0.480	0.176
HHE_M	-0.118	0.134	0.832	0.017	0.098	-0.023
HHE_F	-0.131	0.005	0.886	-0.023	0.217	-0.018
NonHHE_M	-0.065	0.717	0.334	0.185	-0.270	0.161
NonHHE_F	-0.185	0.267	0.753	0.046	-0.073	0.138
Const_M	0.929	0.147	0.004	0.034	0.080	0.033
Const_F	0.599	0.422	-0.144	0.035	-0.134	-0.285
Service_M	-0.105	0.034	-0.177	0.033	-0.870	-0.137
Service_F	0.255	0.340	-0.152	0.187	-0.783	0.018
Eigen Value	3.243	3.203	2.968	2.935	2.503	1.869
% Explained	0.154	0.153	0.141	0.140	0.119	0.089

Source: Based on Population Census, 2011.

Table A2.5. Rotated factor analysis results for eastern region.

West (N=66)	F-1	F-2	F-3	F-4	F-5	F-6
Urb_rate	0.513	0.176	-0.185	0.192	-0.104	-0.664
MigRate_M	0.928	0.047	-0.060	0.088	-0.072	0.243
MigRate_F	0.821	0.094	-0.018	0.023	0.008	0.488
Sex_Ratio	-0.899	0.173	0.075	0.076	0.100	0.109
Share_06 pop	-0.010	-0.901	0.006	-0.094	0.104	0.107
CSR	-0.098	0.219	-0.010	0.802	0.156	0.058
SC_share	-0.311	0.079	0.531	-0.008	0.614	-0.134
ST_share	0.029	-0.048	-0.216	0.328	-0.096	0.776
Litrate_M	0.148	0.915	-0.032	0.113	-0.144	0.069
Litrate_F	-0.052	0.897	-0.021	0.185	-0.096	0.020
WPR_M	0.871	0.125	-0.194	0.013	-0.200	-0.257
WPR_F	0.035	0.275	0.331	0.772	-0.107	0.107
CWR	0.285	-0.867	-0.007	-0.080	0.053	0.093
HHE_M	-0.283	0.271	0.601	0.417	0.069	0.236
HHE_F	-0.071	-0.083	0.840	0.193	-0.016	-0.194
NonHHE_M	0.926	-0.074	-0.060	-0.070	-0.133	-0.149
NonHHE_F	0.896	-0.098	0.096	0.031	-0.114	-0.226
Const_M	-0.547	-0.246	0.141	0.042	0.677	-0.010
Const_F	-0.107	-0.328	-0.060	0.023	0.838	0.036
Service_M	-0.840	0.183	-0.087	0.361	-0.005	-0.075
Service_F	-0.277	0.394	-0.579	0.349	-0.250	-0.217
Eigen Value	6.419	3.877	1.967	1.932	1.791	1.696
% Explained	0.306	0.185	0.094	0.092	0.085	0.081

Source: Based on Population Census, 2011.

Table A2.6. Rotated factor analysis results for southern region.

South (N=106)	F-1	F-2	F-3	F-4	F-5	F-6	F-7
Urb_rate	0.356	0.237	0.024	-0.286	-0.276	0.105	0.599
MigRate_M	0.100	-0.082	-0.090	0.935	-0.122	0.092	0.098
MigRate_F	0.032	0.152	-0.015	0.935	-0.025	0.232	-0.086
Sex_Ratio	-0.088	0.856	0.023	0.031	0.056	0.107	-0.194
Share_06 pop	-0.046	-0.218	0.941	-0.042	-0.014	-0.042	-0.006

CSR	0.030	0.251	-0.199	0.122	-0.197	0.716	-0.195
SC_share	0.140	-0.286	-0.003	-0.461	-0.082	-0.238	-0.594
ST_share	-0.240	-0.172	0.094	0.030	0.023	-0.208	0.592
Litrate_M	-0.007	0.734	-0.461	0.042	-0.239	0.030	0.226
Litrate_F	-0.029	0.813	-0.324	0.094	-0.287	0.042	0.254
WPR_M	0.615	-0.288	-0.543	-0.057	-0.131	-0.086	-0.143
WPR_F	0.570	-0.257	-0.326	-0.116	0.337	-0.106	-0.230
CWR	-0.022	-0.118	0.942	-0.070	-0.012	-0.047	0.030
HHE_M	0.162	-0.225	0.111	-0.036	0.643	-0.224	-0.094
HHE_F	0.080	-0.081	-0.025	-0.122	0.875	-0.008	0.044
NonHHE_M	0.861	-0.136	-0.040	0.082	-0.047	-0.162	0.069
NonHHE_F	0.813	0.126	-0.013	0.107	0.237	-0.065	0.179
Const_M	-0.124	0.252	0.049	0.262	0.032	0.794	0.254
Const_F	-0.150	-0.424	-0.032	0.281	-0.062	0.730	-0.050
Service_M	-0.721	-0.167	-0.075	-0.080	-0.140	-0.123	0.327
Service_F	-0.543	0.251	0.001	0.073	-0.564	0.050	0.411
Eigen Value	3.218	2.829	2.571	2.287	1.990	1.984	1.735
% Explained	0.153	0.135	0.122	0.109	0.095	0.095	0.083

Source: Based on Population Census, 2011.

Table A3. Description of variables included in the factor analysis.

Variables	Description
Urb_rate	Urbanization Rate (%)
MigRate_M	Male Migration Rate (%)
MigRate_F	Female Migration Rate (%)
Sex_Ratio	No of females per 1000 males
Share_06 pop	Share of 0-6 years pop in total population (%)
CSR	Child Sex Ratio (Per 1000)
SC_share	Share of Scheduled Caste in total Population (%)
ST_share	Share of Scheduled Tribe in total Population (%)
Litrate_M	Male Literacy Rate (%)
Litrate_F	Female Literacy Rate (%)
WPR_M	Male Work Participation Rate (%)
WPR_F	Female Work Participation Rate (%)
CWR	Child women Ratio (per 1000 women)
HHE_M	Share of main male worker in Household Enterprises (%)
HHE_F	Share of main female worker in Household Enterprises (%)
NonHHE_M	Share of main male worker in Non Household Enterprises (%)
NonHHE_F	Share of main female worker in Non Household Enterprises (%)
Const_M	Share of main male worker in Construction work (%)
Const_F	Share of main female worker in construction work (%)
Service_M	Share of main male worker in service sector (%)
Service_F	Share of main female worker in service sector (%)
Cul_M	Share of main male worker in cultivation (%)
Cul_F	Share of main female worker in cultivation (%)
AgL_M	Share of main male worker as agricultural labourers (%)
AgL_F	Share of main female worker as agricultural labourers (%)
For_M	Share of main male worker in forestry (%)
For_F	Share of main female worker in forestry (%)

Note: These variables have been calculated separately for the rural and urban areas.

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