Resource Allocation in lieu of State's Demographic Achievements in India: An Evidence Based Approach

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Executive Summary

States in India are at different stages of demographic transition which is reflected in varying degrees of socio-economic, health and demographic achievements. As a consequence, the opportunities and challenges faced by them are also different in its economic structure in creating adequate jobs for the growing youth population. We should acknowledge those states which have positive accomplishment in its demographic front and reward them for their efforts and commitment towards realizing the target of population stabilization. At the same time, special attention should also be given to those states which lag behind in accomplishing the demographic goal of replacement level of fertility. These necessitate scientific and evidence based strategies for resource allocation, planning and policy implementation. In this paper, we put forward a suitable approach to allocate resources based on the states' demographic achievements, particularly based on progress made towards realising replacement level of fertility. On examining the population growth differential across states during 1971-2011, it is observed that migration has shaped growth more than the pattern of natural increase. Designating the states as dividend and dependent states based on a comparison of dependency against the national scenario, it is noticed that three to four most populated states continue to be in the category of dependent states as against others becoming dividend states. Examining the quantum of migration to urban areas in adjustment to its quality component plays a major role as the gaining and loosing states with a mutual distance. The methods adopted for designing population based weights for resource allocation moderates the gap between demographically advanced states and the states yet to catch up. An alternative proposition of designing such weights that account for the population count and share together also suggests weights that moderates the differences between states otherwise obtained based on population shares alone.

1. Context

The recent contention and debates regarding the use of population share in federal transfer was not based on the 1971 census but the most recent 2011 census has raised unfounded fears and anxieties regarding states being successful in population control to lose against those who have failed (Rajan and Mishra, 2018).

The socio-economic and demographic issues of each state are distinct in nature, and they need due consideration within the calculus of resource allocation for the states. The state which has more elderly or receives more internal migrants perhaps needs more resources, while another state with more child dependents too needs similar consideration in the allocation of resources. In other words, the characteristics and composition of population is vital beyond its count and proportion in the judgement of resource allocation. Till now, the share of population served as the yardstick for resource allocation that renders states with success in controlling its population to lose and those lagging in this effort to gain. This anomaly has led to a rethinking on consideration of characteristics and composition of population to guide the principles of allocation beyond population share alone. Such revised principles of allocation essentially involve accommodation of emerging needs in the calculus of allocation along with the population share so as to be fair in terms of rewarding states with success in population control and at the same time giving due consideration to states lagging behind. In this context, this is a modest attempt at suggesting an alternative scientific method for the weight estimation for resource allocation across states.

Specifically, the objectives of the paper are as follows: a) to examine the inter-state variation in trends in population growth during the period 1971-2011 and beyond; b) to decompose the population growth in terms of the natural increase (births minus deaths) and migration; c) to reckon with quality dimensions namely education, distance of migration and social group identity in categorising the losing and gaining status of states in terms of migration; d) to differentiate the states into dividend states and dependent states based on the population composition and e) to design appropriate weights for devolution of resources in recognition of the demographic diversity among Indian states. The data for the purpose has been obtained from Census of India's National Sample Survey and Registrar General of India's population projections.

2. Motivation

In India, the states are differently placed with regard to their demographic achievements that is depicted in the population growth experience and finally reflected in the size of the population. It is a general perception that the challenges faced by a state depend on the size of the population. In fact, merely taking the size of the population does not depict the true nature of the challenges faced by a state. Rather the characteristics and composition of the population matters in comprehending such challenges. The challenges and opportunities are also linked with composition of the population. If a population is skewed towards younger ages or has a larger working age population or a relatively greater number of the aged, the challenges are varied in terms of provisioning for a population with a differential composition. Such differences needs consideration while making allocation based on the need for welfare.

It is rather naive to assume that states having less population count require fewer resources when compared with those with a larger population size. Mere size need not necessarily be the criteria to determine the need for resources as the composition of the population implying differential levels of dependency becomes crucial on this count. For instance, a state having higher proportion of senior citizens and disabled faces a different challenge when contrasted against another state with a large proportion of young children and working population.

In such circumstances, count alone will not help us to understand the real challenges of the population and the burden of the state. We need to obtain equivalence in recognition of varying burden of states. In other words, the characteristics of the population should take precedence over its count towards recognition of the challenges and opportunities of the states.

While population share has continued to be the yardstick for resources allocation, the time has come to accommodate varying characteristic features of the population within its raw share to obtain equivalence that is conditioned by needs and priorities. Such a modification to the prevailing norm can perhaps go a long way in addressing apparent contradictions in rewarding those who lag in the process of population stabilization vis a vis those who succeed. This is a modest attempt in that direction with alternatives to be chosen by the planners and policy makers for resource allocation to the states in India.

3. Methodology

The research method applied in this paper essentially involves dimensional adjustment (Mishra, 2006) as it tries to accommodate alternative features of the population into the raw share of population. When it comes to quality adjustment of quantum, the principle of equivalence is adopted by keeping the quantum corresponding to the best quality unchanged and reading other quantum in relative terms. Finally, as the problem relates to the conflict between size and share of population, a combination of these two is proposed in computing a revised share of population that has considered weights of the size of the population.

Dimensional adjustment is carried out by normalising the population share as well as other features like share of child and elderly population etc in unitary terms (ranging between 0 and 1) and aggregating these normalised values using arithmetic mean as well as geometric mean to represent the normalised value for the adjusted population share. Based on this normalised value, the real population share is recomputed. (See Appendix for detailed illustration)

With regard to quality adjustment of quantum, the quantum is read in relative terms against the quantum that corresponds to the situation of the best quality.

The final approach of proposing a combined formulation of size and share of population together computes an index that considers the size convergence with square root and one plus the observed share as a multiplier (Subramanaian, 2005). In this process the larger share gets a greater multiplier with the population size being revised duly with a decimal power (here 0.5). This approach can be considered as a moderation of both size and share in one measure.

4. Input Tables (Figures at a glance)

Prior to proposing alternatives to population share and its modification, we offer a premise on the share of the population and its growth, migration and dependency at the state level for better understanding of the issue of concern.

4a Share of Population

The percentage share of population between 1971, 2011 and 2021 and share differences between 1971-2011 and 2011-2021 for all states is given in Table 1. The results indicate that, in 1971, Uttar Pradesh had the largest share (16.3 per cent) of India's population, followed by Maharashtra (9.3 per cent), West Bengal (8.2 per cent), Andhra Pradesh (8.0 per cent), Tamil Nadu (7.6 per cent), and Bihar (7.5 per cent). On the other hand, states such as Assam (2.8

per cent), Gujarat (4.9), Kerala (3.9 per cent), and Punjab (2.5 per cent) reported their percentage less than 5 points. Since then, differential levels in fertility, mortality and migration have resulted in the changing share of population over the last 40 years. State's ranks in terms of share of population have changed over the decades, except for Uttar Pradesh which continues to occupy the number one position. Some states gained and some others have lost their share in the population. Between 1971-2011period, Bihar (1.2 per cent) and Rajasthan (1.0 per cent) recorded an increased share of population, whereas Kerala and Tamil Nadu registered a decreasing share of 1.1 and 1.5 percentage points respectively.

Based on the population projections for 2021, the projected share of population of five states namely Uttar Pradesh, Maharashtra, Bihar, West Bengal and Madhya Pradesh together accounts for nearly half (49.8 per cent) of the India's total population. However, increased share of population during the period of 2011-2021, is observed only for few states such as Uttar Pradesh, Madhya Pradesh, Maharashtra and Telangana.

4b Population Growth and Migration 1971-2011

Differential population growth across Indian states over period of time has been recognized as the demographic divide which owes significantly to the differential regimes of fertility and mortality. This difference in population growth has not only led to the varying size of the population but also has shaped its composition at large (Rajan, Mishra and Sarma, 1999).

When one compares the population growth rate since 1971, the declining trend could very well be universal but the rate of decline differs across regions. The comparison of population growth rate is often associated with the levels of fertility and mortality, the interaction between the two is referred as natural growth rate of population. However, among states, population growth of states is not merely a result of its levels of fertility and mortality, but also internal mobility (in and out migration). Hence, a comparison of population growth rate across regions, need to be read in terms of the two components i.e natural growth rate and migration (Bhat and Rajan, 1990). Analysing this population growth rates during the period 1971-2011 over the decades, it is apparent that population growth in specific regions are shaped by migration as compared to fertility and mortality.

The decadal growth rate comparison across states displays a few states like Rajasthan, Uttar Pradesh, Bihar, Madhya Pradesh etc to be having a distinctively higher population growth compared to other states. But when the same is compared in terms of natural growth rate

there seems to be a greater convergence indicating the tendency towards realizing low fertility and low mortality situation in course of time.

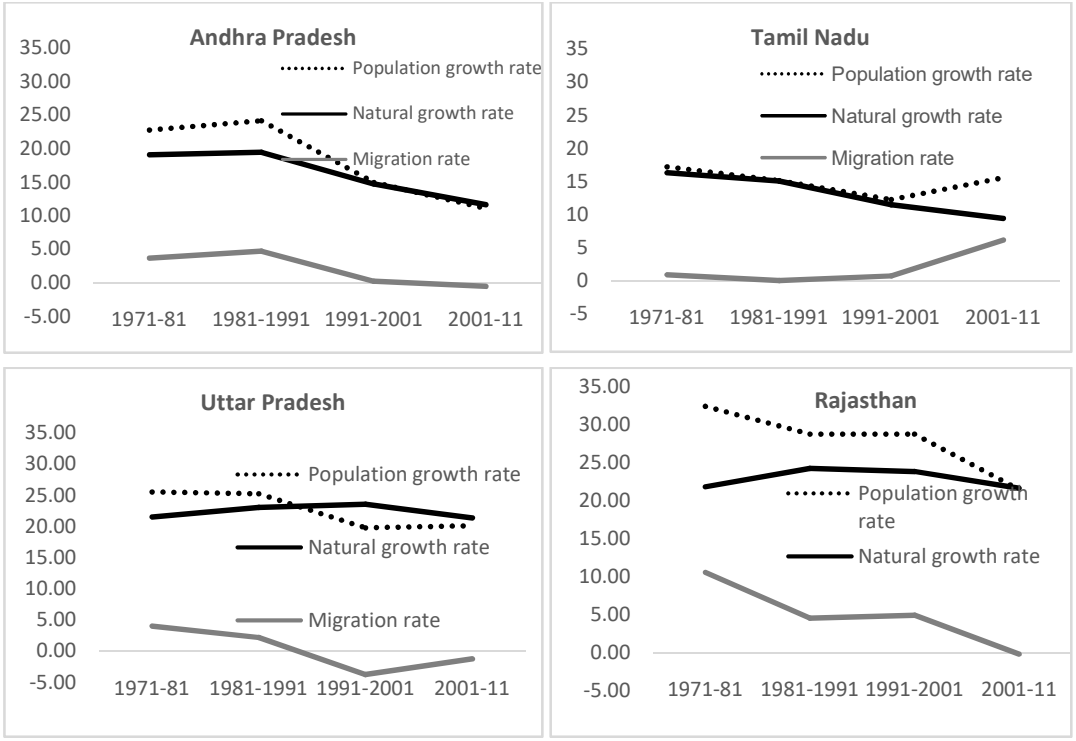
When population growth rate is decomposed into natural component and migration component, it is quite clear that few of the states' population growth are influenced by internal migration. This exercise for all states over the period of last four decades 1971-2011 is presented in Table 2. It provides insight regarding the role of migration in differential population growth across Indian states (Zachariah, Mathew and Rajan, 2003).

5. Broad Analysis

5a. Population Growth Differentials

As we discussed in the previous section, the observation on systematic response of migration to that of population growth rate is made with an illustration for four big states; two from south India and two from North India (see Figure 1). In all the selected states, the agreement in pattern of population growth, natural increase and migration is observed. However, this is not seen in the case of natural growth rates, implying that unlike the natural growth rate, migration seem to have a reasonable response to the population growth rate. Although, the quantum influence of migration on the population growth rate may not seem large, it does have a wider difference across the Indian states over the last four decades.

Figure 1: Population Growth Differentials among Selected States of India, 1971-2011



Source: Same as Table 2

5b. Dividend and Dependent States

In this section, an attempt is made to recognise privilege and adversity in terms of the differential characteristics of population between the states. This would help us designate the states as dividend and dependent states because of the age structural transition experienced over the time. A high dependency ratio implies that there are more consumers than producers and there is a greater burden in supporting the young and senior population. This is a good indicator of situating a population with regard to its position of comparative advantage/ disadvantage in relation to its potential need for support.

The three aspects considered for dependency are young dependency, old dependency, and total dependency. The young, old and total dependency ratios for states and union territories for the periods 1971 to 2021 are presented in Tables 3 to 5.

Young dependency ratio gives the number of persons in 0-14 years depend on every 100 economically active persons, 15-59 years (Table 3). In 2011, the highest ratio among the states was observed in Bihar (76.9) followed by Meghalaya (71.6), Uttar Pradesh (64.0), Jharkhand (63.8), Rajasthan (60.1), and the lowest values were observed in Goa (32.6) and the southern states of India namely Tamil Nadu (35.8), and Kerala (36.7). The same pattern can be observed in 2001 also. It is expected that in 2021 Meghalaya would have the highest level of young dependency ratio (64.5) among the states, and it will be followed by Uttar Pradesh (64.0), Bihar (62.6) and Jharkhand (58.2). In future, Kerala will have the lowest level in young dependency ratio (26.0).

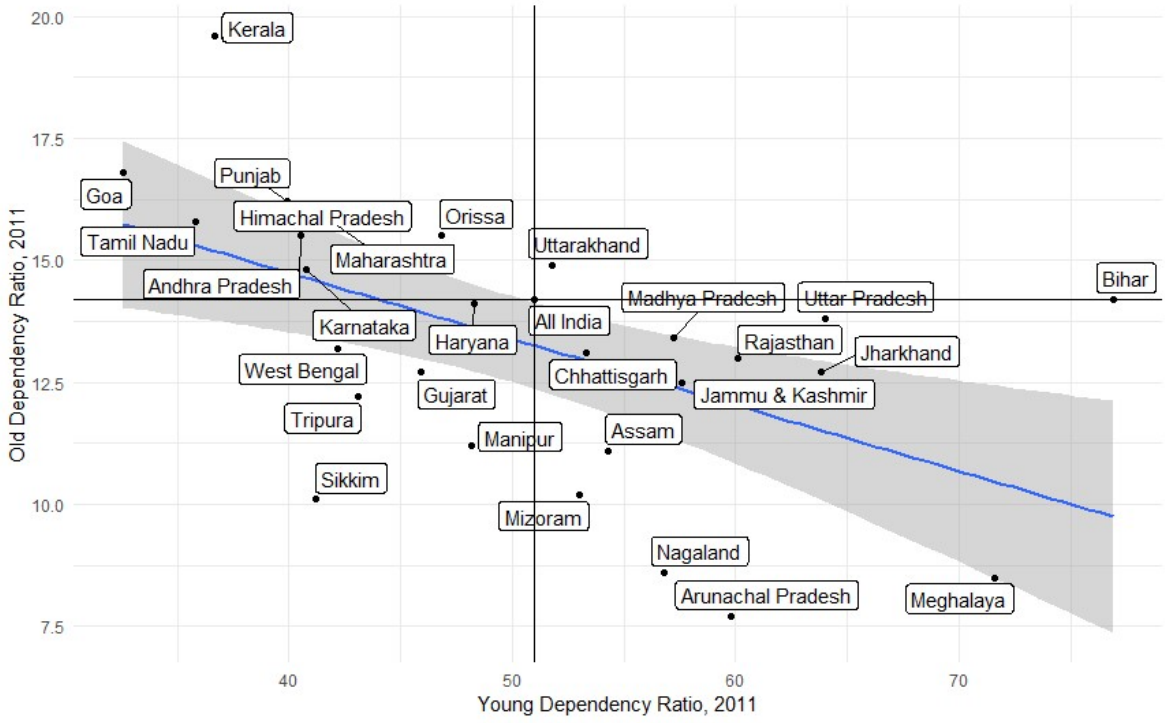
Old age dependency ratio gives the number of persons in 60 years and above depends on every 100 economically active persons in ages 15 to 59 years. In 2011, the old dependency ratio of India was 14.2 (Table 4). Among states, Kerala had reported the highest level of old dependency ratio since 1991. The states that could successfully implement the family planning programs have relatively higher old dependency ratio. In 2011, the highest old dependency was observed in Kerala (19.6) followed by Goa (16.8), Punjab (16.2) Himachal Pradesh (16.1), Tamil Nadu (15.8), Maharashtra (15.7), Andhra Pradesh, Orissa (15.5 each) and Uttarakhand (14.9). The lowest old dependency was observed in Nagaland (8.6), followed by Meghalaya (8.5), Arunachal Pradesh (7.7), Sikkim (10.1) and Mizoram (10.2).

Total dependency ratio gives the average number of young and old aged persons depend on every 100 economically active individuals. Operationally the economically active population

is defined as the number of persons aged 15 to 59 years. It is a robust measure of the demographic dividend in the states.

In India, the dependency ratio declined from 93.1 in 1971 to 59.4 in 2011 (Table 5). Many states have a dependency ratio higher than all-India figures. The ratio is higher among the states with relatively higher proportion of children in the age group of 0 to 14. Even though the old age population is a factor of this ratio, child population relatively contribute more to the levels of dependency ratio particularly in the states which are demographically lagging behind. South Indian states - Andhra Pradesh, Kerala, Karnataka, and Tamil Nadu - show similar dependency ratio and their levels are significantly determined by their old age population. The northern states generally show higher levels of dependency rates as compared to that in southern states. In the country, the higher levels of dependency are observed in Bihar (91.1) and Uttar Pradesh (77.8) in 2011.

Figure 2: Classification of states based on young and old dependency ratio, India 2011



Source: Compiled by the authors using Census of India, 2011

Table 6 shows the classification of states into dividend and dependent states on the basis of the total dependency ratio from 1971 to 2021. The classification is based on the total dependency ratio of India as those states which have lower value than the national figure are

termed as dividend states and the rest as dependent states. However this kind of classification would not really reflect the true nature of the burden of the states. The states which showed higher values of dependency ratio are those with high levels of young dependency. On the other hand, states which are below replacement level of fertility have higher levels of old dependency.

In 2011, 12 states were dependent states and the rest were dividend states. On examining the young and old dependency ratio, it can be seen that states like Kerala, Goa, Tamil Nadu, Andhra Pradesh, Karnataka, Punjab, Himachal Pradesh, Maharashtra and Orissa have a higher level of old dependency ratio and a lower level of young dependency ratio as compared to that of the country (see figure 2). In other words, these states are disadvantaged because of the elderly population when compared to their younger population. Uttarakhand was the only state which showed both young and old dependency ratios higher than that of India. States like Karnataka, West Bengal, Gujarat, Manipur, and Sikkim have lower levels of both young and old dependency ratio compared to that of the country. On the other hand, Rajasthan, Madhya Pradesh, Uttar Pradesh, Bihar, Jharkhand, Assam, Mizoram, Arunachal Pradesh and Meghalaya have a relative disadvantage because of children than elderly persons. The differentials in young and old age dependency are also reflected in the total dependency rates.

6. Adjustments

In this section, we explain how we adjust population share with relevant indicators like dependency ratio and migration. At first, we briefly explain the methodology for migration adjustment.

6a. Migration (a dimension of quality)

Quality adjusted quantum migration

Inter-state and intra-state migration in India is mainly measured in terms of the quantum flow which occurs between one region and another. In other words, migration pattern is often seen as quantum in-migration and quantum out-migration or net-migration across states.

The internal migration literature in India mainly uses four streams of migration viz rural-urban, rural-rural, urban-urban, and urban-rural (Rajan, 2011). Studies on quantum migration suggest that the higher income and richer states such as Delhi, Maharashtra, and Gujarat are the major receivers of human capital or gainers of migration. Though quantum method of

calculating migration trends and patterns are extremely useful in assessing migration flows in India, it has the limitation of relying on the quantum, overlooking the aspect of quality comprising of characteristics differentiating one migrant from another.

Qualities comprise of migrant characteristics such as the type of migration, origin, education level of migrants and migrant's age. In other words, migrants cannot be counted as equal irrespective of their origin, the reasons for migration and many such attributes/characteristics. They need to be differentiated from one another while commenting on the consequences of migration such as human capital gain in a region. Among migrants, the productivity of different skills, education level, and age groups vary between regions, depending on differences in natural resources or varying production technologies of local employers. This results in regional-specific returns to an individual's human capital (Rabe and Taylor, 2010).

On this account, we dwell upon an assessment of internal migration through quality adjusted quantum migration which will offer a realistic and eligible comparison of gaining states.

The qualities considered for the quantum-quality analysis are as follows:

a. Quality based on human capital/education.
b. Quality based on distance.
c. Quality based on origin.
d. Quality based on age (youth migration).
e. Quality based on overall migrant characteristics - male, youth, inter-state, and Graduate and above.

However, in this study, only in-migration is considered due to data limitations as National Sample Survey Organization (NSSO) data does not provide information on certain out-migration particulars such as education level and detailed employment status such as self-employed, regular wage/salaried and casual labor. In addition, the analysis is confined to the urban destination because migration to urban areas is motivated by a host of economic factors and attracts heterogeneous groups of migrants with different levels of endowments and skills. On the other hand, the rural areas attract mostly agricultural and unskilled laborers.

Quantum-quality assessment using Relative weightage from shares:

The relative weight share or relative weight is used in this study for measuring relative positions of the Indian states in attracting migrants with a given quality. Detailed explanations are provided in Table 7.

For this analysis, first, a particular quality is considered, for example, the quality based on age, i.e., youth. Therefore, the share of youth in the migration stream is calculated for all the states. Here, y is the selected quality, i.e., (Youth) across states-A, B…, and X1, X2…, are the corresponding dominance/percentage share of youth in the migration stream for each state. Next, from the group of states, the best outcome, i.e., the higher share of y is taken as the reference category or the reference state.

Table 7 Methodological Illustration (Relative Weight from Share)

State-A	*X1.(y)A*	$\frac{X1.(y)A}{X3.(y)C} = bW$
State-B	*X2.(y)B*	$\frac{X2.(y)B}{X3.(y)C} = aW$
State-C	*X3.(y)C*	$\frac{X3.(y)C}{X3.(y)C} = 1(W) *$
State-D	*X4.(y)D*	$\frac{X4.(y)D}{X3.(y)C} = cW$

Source: Provided by the authors for illustrative purposes only.

For example, state-C is considered as the state with the best outcome as shown in the third row of Table 7 where a weight of 1.00 is given to state-C. Given best outcome as weight-1.00, the relative weight is calculated for the remaining states. Here, the results not only show the usual ranking of the states but also captures the actual position/distance of each state from the state which represents best quality share.

The calculation for the quality unadjusted relative weight position is calculated on the basis of the density of migrants or total in-migration per thousand population. Here, the y is the total migration density (without controlling for any quality). Then the relative weight position is calculated for each state using the above methodology. In other words, the quality unadjusted relative position is based on the quantum flow of migration at the urban destination, whereas, the quality-adjusted relative position is based on the quality of the flow of migration at the destination. The quality-adjusted relative positions of the states are then compared with the quality unadjusted relative positions of the states. It is important to mention that the quality unadjusted relative position of the states differ for the two categories of analysis, viz. all migrants and inter-state migrates. However, for each of these categories, the quality unadjusted relative position of the states is same for all the above-mentioned qualities except for the combined quality (quality based on overall migrant characteristics: male, youth, inter-state, and graduate and above).

Quality adjusted quantum migration based on Human Capital/education:

Migration especially in-migration brings people who are endowed with varying aspects of human capital, i.e., skills, knowledge and expertise. Studies have shown that human capital is very important for migrant receiving nations in which migrants play an important role in economic development (Kapur and McHale, 2005). It is also specifically argued that urban areas attract talented individuals who help to generate new ideas for faster and accelerated economic growth in the cities (Jacobs, 1961; Lucas, 1988). However, given the wide regional disparity in economic and social development across India, it will perhaps be naive to assume that all regions or states attract migrants with similar features of human capital. The kind of migrants or the skill level of migrants a state attracts is also determined by the economic opportunities it offers in terms of gainful employment. Therefore, it can be assumed that a place which has a higher level of industrialization or construction activity will attract more migrants whose skill levels are in keeping with the opportunities in such sectors. It is also true that each region/state attracts migrants possessing different skill level and with educational qualification varying from illiterate to highly educated migrant cohorts. Therefore, it is obvious that the composition of in-migrants with different skill level ought to be different across different regions/state. Chandrasekhar and Sharma (2014) argued that Delhi, Gujarat, and Maharashtra attract migrants with varied level of educational attainment. In contrast, Karnataka attracts a sizable proportion of migrants who have completed higher secondary and diploma or graduate and above, while the states of Punjab and Haryana attracts those who have not completed primary school.

To determine the level of human capital in-flow across states, four different categories or qualities of human capital are considered for analysis:

i. Edu1: Literate without any schooling; literate without formal schooling which includes literate through NFEC/AIEP; literate through TLC/AEC; others; literate with formal schooling includes EGS, below primary, primary, upper primary/middle.
ii. Edu2: Secondary, higher-secondary, diploma/certificate course.
iii. Edu3: Graduate, post-graduate and above.
iv. Illiterate migrants.

All Migrants (Human capital as quality)

Similar to the previous sections, the quality unadjusted column is based on the share of migrant density per thousand population in the urban areas. It is observed that for quality unadjusted for all migrants, the state of Himachal Pradesh has the best outcome with the

weightage of 1.00. Comparing the quality unadjusted relative position with the quality adjusted relative position for human capital categories, it is observed that the pattern changes and each human capital qualities exhibits different outcomes.

Table 8 shows that in the case of Edu1, i.e., the migrants who are literate but whose maximum education is limited to middle school or lesser, Kerala represents the best outcome with a weight of (1.00). This implies that compared to all other Indian states, Kerala represents the highest dominance of Edu1 in the total migration stream. The states which have relative weight closer to Kerala are West Bengal (0.94) and Chhattisgarh (0.89).

For Edu2, which mainly comprises the secondary, higher-secondary, diploma/certificate course, the state with the highest dominance is Delhi (1.00) followed by Himachal Pradesh (0.96), Punjab (0.85) and Kerala (0.83). In the case of Edu3 as the quality which represents graduate, post-graduate and above migrants, Delhi (1.00) emerges as the best outcome. The other states are further away from Delhi, with Kerala (0.51) and Maharashtra (0.50) being relatively close. On the other hand, when it comes to the inflow of illiterate migrants, the state with the best outcome is Bihar (1.00) closely followed by Rajasthan (0.90), Uttar Pradesh (0.88), Andhra Pradesh (0.85) and Jharkhand (0.81). Apart from Andhra Pradesh, all other states belong to the Empower Action Group (EAG) category, and most of them are also the poorest states in the country with lowest per capita income.

Inter-state migrants (Human capital categories as quality)

Table 9 presents the comparative assessment of inter-state quantum of migration in consideration of human capital attributes. The patterns and the relative position for each of the human capital categories/qualities change across states. The quality unadjusted relative position for inter-state in-migration shows that Delhi has the best outcome with the weight of 1.00, i.e., Delhi has the highest density of inter-state migrants in India followed by Uttaranchal (0.87). In the case of Edu1 as quality, Gujarat represents the best outcome with a weight of (1.00). The states which have relative weight close to Gujarat are Kerala (0.92) and Himachal Pradesh (0.90). For Edu2, it is observed that the state with best outcome is Karnataka (1.00) followed by Tamil Nadu (0.93), Delhi (0.91). For Edu3 as quality, again Karnataka has the best outcome (1.00), closely followed by Tamil Nadu (0.95). On the other hand, when it comes to the inflow of illiterate migrants from other states, Uttar Pradesh (1.00) has the best outcome closely followed by Jammu and Kashmir (0.99), Chhattisgarh (0.93), Rajasthan (0.92) and Bihar (0.91). It is observed here that except for the hilly state of Jammu

and Kashmir, all others states belong to EAG category. Given that these states are economically backward, it can be argued that the poorer states which lack employment opportunities in the organized sector attract illiterate migrants.

Quality adjusted quantum migration based on Distance

The term distance is usually associated with the distance travelled in terms of proximity from one place to another. In this section, the term distance is used to represent the inter-state and the intra-state mobility. Inter-state migration is also referred as long distance migration (Srivastava, 2011). In migration centered literature distance is referred to as within the district, to the neighbouring district or cross country migration (Deshingkar, 2006). In the usual sense, the term distance may not always be appropriate in the context of inter and intra-state migration given the fact that some states are very large in size and hence, the migration distance within the states could also be much greater when compared with the inter-state migration from a bordering state. Nevertheless, the term distance has a broader connotation. The rationale behind considering distance as a quality is because of its associated complexities involved in inter-state migration compared to intra-state migration. Migration beyond the state border requires higher cost, information, adapting to the different culture, food habits and language. For example, migration from the Northern or the North-eastern states to the Southern states and *vice versa* is more challenging compared to within state or intra-state migration.

Table 10 shows that for inter-state migration, Delhi represents the best outcome (1.00). The obvious reason for Delhi having the best outcome is the small size of the state with intra-state migration almost being absent when compared to other states. The other states with next best outcomes or relative weight for inter-state migration are Uttaranchal (0.39), Haryana (0.39) and Punjab (0.28).

For the intra-state migration, the relative weight position shows that Bihar is having the best position (1.00) which is closely followed by Orissa (0.99), Andhra Pradesh (0.99) and Jammu and Kashmir (0.98). These states have a migration pattern which is mostly dominated by intra-state migration in the total migrant cohorts. Such a pattern implies that these states attract less inter-state migrants compared to other states.

Quality adjusted quantum migration based on Origin

Origin is another important determinant of migration. The decision to migrate, the type of migration, the reasons for migration are very much determined by the characteristics of

origin. It is normally understood that there is a huge difference between urban and rural origin migrants. To begin with, the migrants originating from the urban areas mainly prefer to move to other urban destinations either within the state or outside the state. Although there may be some exceptions where people move to rural areas, such numbers are meager given the overall quantum migration. These migrants have better information about the job market and are more interested in getting into better employment conditions reflected in their higher wages. Most of these migrants are literate, well-educated and possess better human capital and economic endowments compared to the migrants originating from the rural areas. On the other hand, the migrants from rural areas move to both rural and urban destination within and outside the state boundarires. These are the migrants mainly originating due to surplus labor in agriculture. The migrants from rural areas who move to rural destination mainly migrate to be employed as agricultural laborers. On the other hand, those who migrate to urban destination mainly work as casual laborers or daily wage earners in industry and construction sector. This is true for both intra-state and inter-state migration. Studies show that in India, the labor market in the urban locations are mainly identified by the people who have mostly migrated from the rural and backward areas.(Turrey, 2016). The study also shows that it is mainly the unskilled migrants move from relatively destitute and miserable areas in search of productive employment and higher living to the urban destination.

All migrants (Origin as quality):

Table 11 shows that for all migrant's category, compared to the quality unadjusted relative position, the quality-adjusted relative position changes drastically.It is observed that Delhi (1.00) has the best position in terms of receiving migrants from the urban origin, followed by Tamil Nadu (0.70), Punjab (0.65), Uttaranchal (0.65) and Maharashtra (0.64). While, for the rural origin migrants, Bihar has the best position (1.00), followed by Orissa (0.97) and Chhattisgarh (0.96).

Inter-state migrants (Origin as quality):

For inter-state migration, the quality unadjusted relative position shows that Delhi has the best outcome. In the case of origin adjusted inter-state migration, a different picture emerges. It is observed that Tamil Nadu has the best outcome (1.00) for urban origin as quality while, for rural origin migrants, Gujarat has the best outcome (1.00).

6b Dependency

In this section, we made an effort to build weights for resource allocation considering the aspects of child population, elderly population, total dependency ratio and median age at the state level.

In the previous section, we have observed that states are positioned differently in accordance with emerging challenges owing to the differential pace and progress in demographic transition. In this section, we develop a computational strategy to account for these demographic challenges in making a fair assessment of state-specific needs and resource allocation (see Appendix for detail methodology). The basic data compiled from 2011 census on share of child and elderly population, total dependency ratio and median age is provided in Table 12.

Among the states, Uttar Pradesh had the highest population share with 16.78 in 2011, and it is followed by Maharashtra (9.44), Bihar (8.74) and Madhya Pradesh (6.1). However, in the case of share of child to total population, the highest level was observed in Arunachal Pradesh (46.98) followed by Bihar (40.08), Meghalaya (39.7), Jharkhand (36.05), Uttar Pradesh (35.69) and Rajasthan (34.61). In case of old age dependency ratio, Kerala (12.55), Goa (11.21), Tamil Nadu (10.41), Punjab (10.33) and Himachal Pradesh (10.24) showed relatively higher values.

The highest dependency ratio was observed in Arunachal Pradesh (102.63) and Bihar (91.08) and lowest values was found in Goa (49.41) and Sikkim (51.32). The median age is higher in Kerala (30.24), Goa (30.19), and Tamil Nadu (30.14). Around 13 states had a median age around 25 years, 12 states had a median age of 20 years and 1 state (Meghalaya) had a median age of 15 years.

Considering four pertinent aspects of population structure (children, elderly, dependency ratio and median age) with a clear demand side impact on health care and state provisioning for quality of human capital, the differences in population share has been moderated. At first, we consider the child and elderly population as they are considered to be the most vulnerable groups in any population that deserves greater care and attention (Rajan, Mishra, Sarma, 2009). The challenges of these two groups are quite different at the state level. For instance, states which have higher out-migration or international migration are more likely to be carrying the burden of old age as well as child care. The other two important indicators that we are considering for the weights computation are ‘dependency ratio’ and ‘median age’ of

population. Dependency ratio is considered as a good indicator that reads the working age group population as a ratio to the young and old population in the states. Median age is a good dynamic indicator of the population aging. The share of population adjusted with different dimension of population using Arithmetic Mean and Geometric Mean for the states for two census years, 1971 and 2011 are given respectively in Tables 13 and 14.

Since the four indicators selected for the computation are in different scales, we have to normalise them before making a weight index for the states. There are two ways of normalising variables in making an index. One method is a transformation of variable using the formula (x-Mean)/Standard Deviation. The other way of normalising variable is by using the maximum and minimum value of each variable using the formula, (Actual value-Minimum Value)/ Range of value. Since we are making weights for the share of population in the states, the appropriate method of normalisation is the second type of normalisation - the use of minimum and maximum values for normalisation. This type of normalisation is often referred to as feature scaling.

The advantage of the normalisation is that it makes the variables unit-free, and thus statistically comparable. In other words, in normalisation, all variables measured in different scales are adjusting their values to a notionally common scale ranging between 0 and 1. These normalised values are ideal for averaging and other such aggregation methods. In this paper, we use two ways of averaging variables: Arithmetic and Geometric mean. The mean of the normalised variables is used to compute the final weights for each of the states.

Using the same method, the shares of population in 1971 were examined in 21 states of India to demonstrate the significance of these selected indicators at different points of time. The states with relatively higher levels of these indicators are more likely to provide a higher estimated weight. For instance, Uttar Pradesh which had a population share of 16.1 percent (a percentage slightly lower than that of the 2011 census) recorded a higher weight as compared to that in 2011(see Table 13). Similarly, in the states of south India, the share of population and its estimated weights for 1971 are relatively more as compared to that in 2011. This implies that the states' relative position in indicators is important in determining the level of estimated weights irrespective of 1971 or 2011.

In 2011, Arunachal Pradesh is a state with relatively higher proportions of young and old age population (Table 14). Its population share in 2011 was 0.1 percent only. While adjusting the share of population with the child population, its weight increased to some extent as AM=6.2,

GM=1.1. Similarly, in the case of Kerala where the proportion of old age population was around 12 percent and having a national population share of 2.8 percent, the weights adjusted with the older population is 3.7 for AM and 5.2 for GM. On the other hand, the lower proportion of children has reflected in the computed indices in child population as AM=1.5 and GM=1.7.

Uttar Pradesh had 16.8 percent of India's population in 2011. Its burden to economic active population is relatively lower as compared to many demographically advanced states. It has been reflected in all indices separately carried out in the analysis. On examining the states, four possible options can be found out: a) the states with higher rates of child population alone, b) the states with higher rates of old age population alone, c) the states relatively having higher rates of both young and old age dependency rates and d) the states without having a higher rates of either young nor old age population. The advantage or disadvantages that makes in the states because of these four conditions are different and it has been reflected in the computed indices also.

In this exercise we have given two options, Arithmetic mean and Geometric mean, to understand the relative importance of various deprivation indices for the state. The geometric mean method usually gives higher levels of rates as compared to that in arithmetic mean method. However, it can be noticed that the value derived through the GM method provide more or less consistent figures with the original share of the population. And thus, diplomatically, the state governments are more likely to accept GM over AM method.

Table 15 shows the proposed weights for resource allocation based on our methodology for 2011 census. It gives the population share adjusted with child and old age population, dependency ratio and median age. When adjusted, the states with higher proportion of population have moderated down in scale and states having better demographic achievements have marginally improved their position.

Kerala has a population share of 2.8 in 2011, while adjusted with the four demographic dimensions its weight is 3.5. Similarly in Bihar, where proportion of old age population is less and proportion of young population is more, the multiple dimension weight (GM) is 6.5. The state has a share of population 8.7 percent. Thus, in almost all cases, the estimated figures behave logically giving enough significance to the state's disadvantages from the young and old population. On examining the geometric weight for 2011, the highest values had been in Uttar Pradesh, followed by Bihar, Rajasthan, Madhya Pradesh, Maharashtra,

Odisha, Jharkhand, and Gujarat. Regarding the population share, the highest value is also for Uttar Pradesh, followed by Maharashtra, Bihar, West Bengal, Madhya Pradesh, Tamil Nadu and Rajasthan.

7. Simple Alternative Method

It is possible to compute alternative weights considering both the size and the share of population in each state. The methodology adopted here is borrowed from poverty comparison considering both head count ratio and the number of poor taken together to make a weighted index (Subramanian, 2005).

Let H be the fraction of population which represent the proportion of population in a state within a country, and A be the population in million, then the alternative weights is computed using the formula

$$\text{Alternative index}=A^{\frac{1}{2}}(1+H)$$

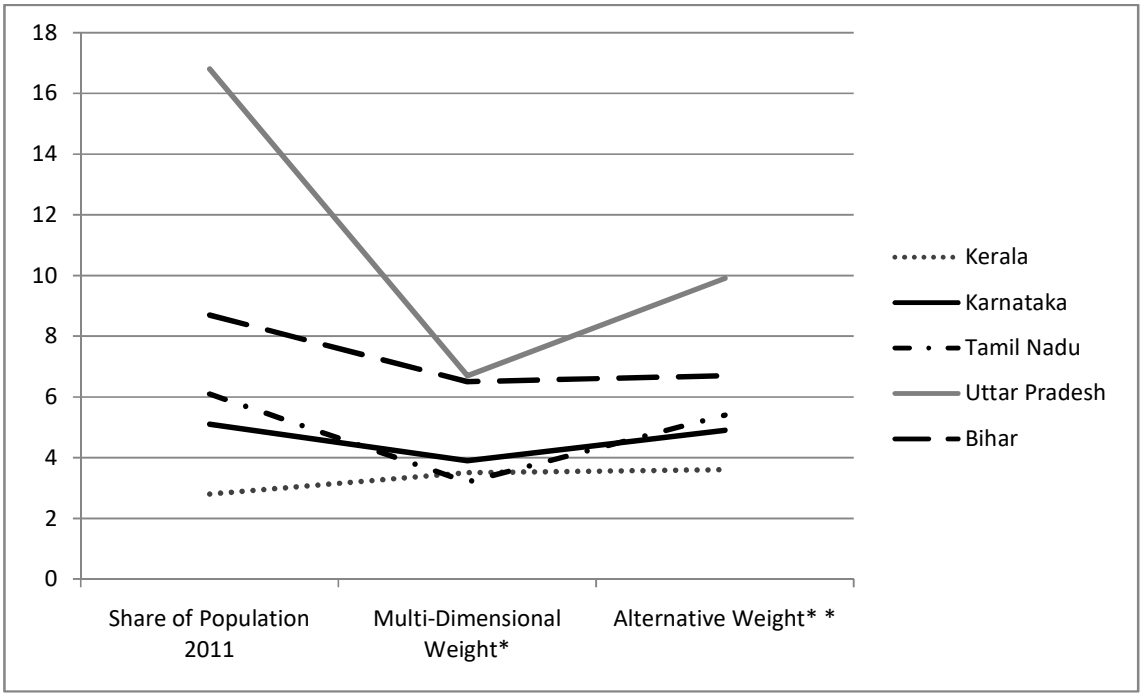
Table 16 presents the alternative weights in consideration of population size and their share using the 2011 census data. The southern states, which are disadvantaged owing to their success in population control efforts do have a lower share but have a relatively greater share of old age population as an adversity. This proposed formulation obtains a marginal increase in weights based on population share in situations of lower share and a similar reduction in weights where the population share is higher. In principle, the differences in raw population share gets moderated to some extent and a semblance of justice is obtained in terms of population share weights for states with larger population getting lowered and for the states with relatively smaller share with slight improvements. The states which have higher population proportion continue to have better weights but those with smaller proportion gain compared to the previous weighs. Using the same methodology we have also computed weights for states based on the 1971 census data and the results are presented in Table 17.

8. Conclusions

Among the different weights discussed in previous sections, the multiple dimension weights computed using geometric mean method, and the alternative weights that take into account both size and proportion are the two best estimated weights that we propose for resource allocation. It is worth mentioning here that the proposed weights have advantages and disadvantages. The weights derived from the multiple dimension method reflects that overall population deprivation arises from the relative magnitude of child and old age population,

dependency towards economically active population, and the overall state's population aging. It is possible to include or exclude other population deprivations like disability, economic dependency, migration and the economic factors like state contribution to the centre pool in terms of tax and others. We argue that the methods adapted here is the best option to accommodate any deprivation indicators for computing the weights. On the other hand, the alternative method considers both size and proportion and does not consider any other factors which are related to the composition of the state population. These weights are more consistent with the share of population than the weights from the other method.

Figure 3: Share of Population and proposed weights for resource allocation in selected states of India



* based on Geometric Mean
**Weights based on both size, and fraction

However, we recommend the multi-dimensional weights over the alternative method because the logic behind its construction is simple and valid. The method can be replicated in the future based on Census Data. The states which are demographically disadvantaged because of higher proportions of children and old age population were given special concern in the proposed weights. At the same time the states that have relatively higher economically active population, and fewer demographic disadvantages also received due consideration.

9. Policy Implications

In this paper, we have made an attempt to understand the changing pattern of population growth during 1971-2011 and decompose the growth in terms of natural increase (births minus deaths) and migration. It was observed that the pattern of population growth agrees more with the changing growth owing to migration rather than that due to natural increase at the state level.

Reading the raw population share of 1971 and 2011, it is apparent that states with success in controlling population growth have marginally lost in their share and the others have consequentially gained. We examined the dependency ratio of states to understand the gaining and losing states. This exercise has revealed that as of the 2011 figures, losing states are 9 out of 29 and gaining states are 20. If the calculation is extended to 2021, half of the states in India will attain losing status.

Nonetheless use of raw population share as a yardstick in the transfer of resources from the centre to state was neither just in the past nor today. In addressing this basic problem, primary concern relates to accounting for differential composition of the population and the state's responsibility to cater to the need of the incoming migrants. On this count, we attempt an exercise towards getting population shares adjusted with compositional attributes like share of child and elderly population, dependency ratio and median age.

The method we used for such an adjustment is the principle of dimensional adjustment. This primarily arises from a situation where a particular phenomenon is represented by numerous dimensions but the pattern across these dimension are mismatched. For instance, if one evaluates the phenomenon of survivorship of any population, it could be represented by dimensions/indicators like Crude Death Rate (CDR), Infant Mortality Rate (IMR), Maternal Mortality Rate (MMR), adult mortality and many others. When this is read across situations and over time, it may not adhere to a uniform pattern/match ranking. In such a situation if we choose one dimension as our preferred choice to represent the phenomenon it becomes necessary to accommodate all other dimensions within the chosen one. Such an exercise is carried out in a simple manner where in all the dimensions are normalized to a unitary scale in a range of values between 0 and 1. Such conversion is kept in conformity with high and low as a logical match across dimensions. Given that this conversion involves independent observed values, the chosen dimension which gets adjusted obtains a revised value following the adjustment. Rather than taking raw population share as the weight for resource allocation,

the proposed weight will be in consideration with accommodating differential demographic challenges (represented by appropriate indicators) arising from the structural and demographic transition of population among states.

Thus, the exercise carried out to obtain an adjusted population share in accommodation of child and elderly population, total dependency ratio and median age in 1971 and 2011 censuses, indicate that population size is not sufficient to depict the true nature of population challenge. Even though the state of Uttar Pradesh has showed larger share of the population in both 2011 and 1971, while adjusting the various population dimensions, there seems to be a reasonable convergence of the revised share across states. This leads to a fair consideration of evolving needs for provisioning rather than the mere count of population. Since the indicators used to compute weights considered all the relevant dimensions of the population, the proposed final weights are more appropriate for resource allocation to states. ***Share based on count ignores equivalence, and accommodation of characteristics therefore assumes significance.***

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Appendix: Methods and Materials

Data: The two main datasets used for the empirical exploration are the decadal censuses and National Sample Surveys (NSS). We have used the census data for the year 1971, 1981, 1991, 2001 and 2011. In addition, we have used the information from National Sample Survey 64th round 2007-08 data on migration (published in June 2010). Also, a few data were extracted from the RGI Population Projection report 2001-2021.

Concepts

Decadal Growth Rate: It is the percentage of total population growth in a particular decade. It is calculated as the ratio of the difference between two census figures divided by the previous census figure expressed in percentage. For instance, the decadal growth rate of 1971 to 1981 is calculated as [(Population 1981-Population 1971)/Population 1971] * 100

Natural Growth Rate: The rate of natural increase is calculated as crude birth rate minus crude death rate.

Net Migration Rate: It is the difference between the number of in-migrants (people coming into an area) and the number of out-migrants (people leaving an area) throughout the year. Net migration is positive if the number of in-migrants is larger than the number of out migrants. In case of states, we are considering the in and out migration.

Child Population: it is the population in the age groups 0 to 14 years.

Elderly Population: it is the population aged 60 years.

Young Dependency Ratio: It is the ratio of population in the age groups 0-14 to the population in ages 15-59 years multiplied by 100

Old Dependency Ratio: It is the ratio of population in the age group 60 and above to the population in ages 15-59 years multiplied by 100

Dependency Ratio: It is the ratio of population in the age groups 0-14 and 60+ to the population in ages 15-59 years multiplied by 100.

Median Age: An indicator of the aging of population. The median age may be defined as the age that divides the population into two equal halves, one of which is younger (less than median value) and the other of which is older (greater or equal to median).
Arithmetic Mean: The arithmetic mean is a measure of central tendency for age distribution. It is generally viewed as less appropriate than the median for the purpose because of the marked skewness of the age distribution of the general population (Siegel and Swanson, 2004).
Geometric Mean: This is an alternative measure for aggregation which is multiplicative in nature where a dimension does not substitute for the other.

Population Adjustment: This particular concept refers to generating population equivalence in consideration of attributes and features that describes adversities and privilege.

Methods

Building Population Weights, from share of population adjusted with other indicators like child and old age population, dependency ratio and median age.

At first normalise all indicators using the formula,

$$N(x)= \frac{Actual\ value\ x - Minimum\ Value\ x}{Range\ x}$$

The normalised variables range from 0 to 1. Then we aggregate these variables using geometric or arithmetic method.
The final weight index is calculated using the following formula
Final Weight=aggregate score × (Maximum Population Share-Minimum Population Share) +Minimum Population Share
If required, this final weight must be adjusted to make sum of all weights to reach 100.

Example:
Let us calculate the weights of Kerala adjusted for child population for the year 2011.
Share of population for Kerala in 2011 = 2.8
Percentage of children in 2011=23.44
Normalized value for share of population = (2.8-0.045) / (16.78-0.045) =0.16
Normalized value for percentage of children = (23.44-21.8)/ (46.98-23.44) = 0.07
Aggregate score (AM) = (0.16+0.07) /2 = 0.12
Similarly, Aggregate Score (Geometric mean) = 0.10
Final crude weights (FCW)
FCW (Arithmetic method) = [0.12 × (16.78-0.045)] + 0.045
FCW (Geometric method) = [0.10 × (16.78-0.045)] + 0.045
Then the above final crude rates must be adjusted for all other states to make it the sum as 100. And thus the final weights for Kerala is as follows
Final weights (Arithmetic mean) = 1.5
Final weights (Geometric mean) = 1.7

Table 1: Share of Population and its Differences between 1971, 2011 and 2021

	Share of Population			Share Difference	
	1971	2011	2021	2011-1971	2021-2011
Andhra Pradesh	8.0	4.5	3.8	-3.5	-0.7
Arunachal Pradesh	0.1	0.1	0.1	0.0	0.0
Assam	2.8	2.6	2.6	-0.2	0.0
Bihar	7.5	8.7	8.4	1.2	-0.3
Chhattisgarh	1.2	2.1	2.1	0.9	0.0
Goa	0.2	0.1	0.2	-0.1	0.1
Gujarat	4.9	5.1	5.1	0.2	0.0
Haryana	1.9	2.1	2.2	0.2	0.1
Himachal Pradesh	0.6	0.6	0.6	0.0	0.0
Jammu & Kashmir	0.9	1.1	1.0	0.2	-0.1
Jharkhand	1.8	2.8	2.7	1.0	-0.1
Karnataka	5.4	5.1	5.0	-0.3	-0.1
Kerala	3.9	2.8	2.8	-1.1	0.0
Madhya Pradesh	5.4	6.1	6.4	0.7	0.3
Maharashtra	9.3	9.4	9.7	0.1	0.3
Manipur	0.2	0.2	0.2	0.0	0.0
Meghalaya	0.2	0.2	0.2	0.0	0.0
Mizoram	0.1	0.1	0.1	0.0	0.0
Nagaland	0.1	0.2	0.2	0.1	0.0
Odisha	4.1	3.5	3.4	-0.6	-0.1
Punjab	2.5	2.3	2.3	-0.2	0.0
Rajasthan	4.8	5.8	5.9	1.0	0.1
Sikkim	0.1	0.1	0.1	0.0	0.0
Tamil Nadu	7.6	6.1	5.4	-1.5	-0.7
Telangana	0.8	2.7	3.0*	1.9	0.3
Tripura	0.3	0.3	0.3	0.0	0.0
Uttar Pradesh	16.3	16.8	17.9	0.5	1.1
Uttarakhand	0.8	0.8	0.9	0.0	0.1
West Bengal	8.2	7.7	7.4	-0.5	-0.3

Source: Census of India 1971, 2011 and Population projection by RGI, 2021
**complied by the authors using the population given in www.telangana.gov.in*
New states that was not in 1971: [Andhra Pradesh – Telangana;
Uttar Pradesh – Uttarakhand; Bihar – Jharkhand]

Table 2: Decadal and Natural Growth Rate, and Migration Rates in India, 1971-2011

State/UTs	Decadal growth rate (%)				Natural growth rate				Migration rate			
	1971-81	1981-91	1991-01	2001-11	1971-81	1981-91	1991-01	2001-11	1971-81	1981-91	1991-01	2001-11
Andhra Pradesh	22.8	24.2	15.0	11.1	19.1	19.4	14.7	9.7	3.7	4.7	0.2	1.4
Arunachal Pradesh	34.2	43.3	22.0	25.9	NA	20.5	17.1	16.2	NA	22.8	4.9	9.8
Assam	36.1	12.0	19.5	16.9	18.2	21.2	18.9	16.2	17.9	-9.2	0.6	0.8
Bihar	23.9	23.6	-3.8	25.1	NA	23.6	21.8	22.2	NA	0.0	-25.7	2.9
Chhattisgarh	NA	NA	NA	22.6	NA	NA	NA	19.7	NA	NA	NA	2.9
Goa	27.1	10.9	12.3	8.2	13.9	11.0	7.3	6.8	13.3	-0.1	5.0	1.4
Gujarat	27.2	21.3	23.0	19.2	22.8	21.3	18.4	16.3	4.5	0.0	4.6	2.8
Haryana	28.0	26.8	29.7	19.9	25.7	25.9	21.5	17.6	2.3	0.9	8.3	2.3
Himachal Pradesh	22.5	20.3	19.2	12.8	20.3	21.1	16.7	11.9	2.2	-0.8	2.5	0.9
Jammu & Kashmir	28.4	29.9	31.7	23.7	20.7	23.5	14.2	13.2	7.7	6.4	17.5	10.5
Jharkhand	NA	NA	NA	22.3	NA	NA	NA	18.4	NA	NA	NA	3.9
Karnataka	26.4	20.9	18.0	15.7	17.4	19.9	16.0	13.4	9.0	1.1	2.0	2.3
Kerala	19.0	14.2	9.8	4.9	19.8	16.4	11.7	8.9	-0.8	-2.2	-1.9	-4.1
Madhya Pradesh	25.2	26.8	-8.8	20.3	21.7	23.3	21.2	20.0	3.4	3.5	-29.9	0.3
Maharashtra	24.4	25.5	23.1	16.0	17.4	20.6	16.2	12.0	6.9	4.9	6.9	4.0
Manipur	33.6	25.5	27.4	18.7	21.5	19.4	14.0	10.8	12.2	6.1	13.4	7.9
Meghalaya	31.2	28.0	36.4	27.8	19.9	24.4	21.1	17.4	11.4	3.7	15.3	10.4
Mizoram	47.0	43.4	26.9	22.8	NA	NA	10.8	12.6	NA	NA	16.1	10.2
Nagaland	49.8	55.2	65.8	-0.5	NA	16.5	15.5	12.5	NA	38.7	50.4	-12.9
Orissa	19.7	19.9	16.8	14.0	16.9	19.0	15.5	12.7	2.9	0.9	1.4	1.3
Punjab	23.0	21.2	20.6	13.7	20.9	20.6	16.7	11.6	2.2	0.6	3.9	2.1
Rajasthan	32.4	28.7	28.7	21.4	21.8	24.2	23.8	21.6	10.6	4.5	4.9	-0.2
Sikkim	50.5	26.6	35.2	12.4	NA	22.0	15.9	14.4	NA	4.6	19.3	-2.1
Tamil Nadu	17.2	15.1	12.2	15.6	16.3	15.1	11.5	9.5	0.9	0.1	0.7	6.2
Tripura	32.4	31.1	18.5	14.8	19.7	17.7	13.4	9.8	12.7	13.4	5.1	4.9
Telangana*	NA	NA	NA	13.6	NA	NA	NA	11.3	NA	NA	NA	2.3
Uttar Pradesh	25.5	25.2	19.7	20.1	21.5	23.0	23.5	21.3	4.0	2.2	-3.8	-1.2
Uttarakhand	NA	NA	NA	19.2	NA	NA	NA	12.7	NA	NA	NA	6.5
West Bengal	23.0	24.8	17.9	13.9	NA	20.6	15.7	12.3	NA	4.2	2.2	1.6
Andaman & Nicobar	21.3	59.6	18.7	6.7	26.9	20.8	14.0	11.7	-5.6	38.7	4.8	-5.0
Chandigarh	75.1	33.3	50.1	17.1	28.3	19.2	13.6	12.0	46.8	14.1	36.5	5.1
Dadra & Nagar Haveli	40.5	34.6	57.5	55.5	21.3	27.4	23.6	23.1	19.3	7.3	33.9	32.4
Daman & Diu	NA	NA	58.2	53.5	NA	NA	16.9	14.0	NA	NA	41.3	39.5
Lakshadweep	25.0	25.0	21.3	6.2	NA	23.2	18.9	11.8	NA	1.9	2.4	-5.6
NCT of Delhi	52.4	51.7	47.4	21.0	21.2	21.3	16.8	13.4	31.2	30.4	30.6	7.6
Puducherry	28.0	32.5	21.8	27.7	18.5	14.9	11.2	9.5	9.5	17.5	10.6	18.2
India	24.8	23.4	21.9	17.6	19.8	21.2	18.6	16.1	5.0	2.2	3.3	1.5

Source: Census and SRS 1971-2011; For Telangana, decadal growth has taken from www.telangana.gov.in. *Natural growth rate for Telangana and Andhra Pradesh has taken from SRS Bulletin 2014 assuming it as constant for the last decade.*

NA: Not Available

Table 3: Young Dependency Ratio (%), India 1971-2021

State	1971	1981	1991	2001	2011	2021
Andhra Pradesh	76.9	70.6	61.8	53.2	40.5	36.4
Arunachal Pradesh	67.1	70.6	71.0	73.3	59.8	56.2
Assam	96.8	NA	69.7	66.0	54.3	49.5
Bihar	82.9	81.6	78.0	82.2	76.9	62.6
Chhattisgarh	NA	NA	NA	66.3	53.3	36.3
Goa	68.9	60.6	57.8	36.9	32.6	26.7
Gujarat	84.5	71.8	64.5	54.5	45.9	39.3
Haryana	98.1	80.4	76.7	63.7	48.3	40.7
Himachal Pradesh	79.3	89.0	67.4	51.9	40.5	41.9
Jammu & Kashmir	83.2	77.0	62.2	62.3	57.6	44.0
Jharkhand	NA	NA	NA	73.2	63.8	58.2
Karnataka	83.4	74.7	62.6	52.8	40.8	36.2
Kerala	76.6	63.0	49.9	41.1	36.7	26.0
Madhya Pradesh	87.5	78.8	73.7	71.2	57.2	53.7
Maharashtra	79.2	67.3	60.7	54.4	42.2	37.3
Manipur	82.7	71.8	62.8	53.9	48.2	41.0
Meghalaya	84.1	79.8	68.8	79.8	71.6	64.5
Mizoram	NA	89.5	63.7	59.8	53.0	51.3
Nagaland	68.3	74.8	60.3	62.4	56.8	51.0
Orissa	83.0	74.5	64.4	56.8	46.8	43.0
Punjab	82.0	67.8	62.7	52.7	39.9	40.2
Rajasthan	88.3	83.5	76.7	75.5	60.1	42.4
Sikkim	66.2	70.7	67.5	58.9	41.2	47.1
Tamil Nadu	67.7	60.3	51.4	42.0	35.8	29.1
Tripura	89.8	73.4	66.0	57.0	43.1	40.0
Uttar Pradesh	81.3	83.5	76.8	79.1	64.0	64.0
Uttarakhand	NA	NA	NA	65.3	51.8	57.0
West Bengal	84.3	70.7	62.5	55.8	42.2	40.6
Andaman & Nicobar Islands	63.9	69.1	53.5	46.4	35.4	38.4
Chandigarh	56.5	53.3	44.9	36.9	36.9	32.7
Dadra & Nagar Haveli	90.2	79.3	61.7	67.4	48.6	57.7
Daman and Diu	NA	NA	55.6	43.5	31.1	36.5
Delhi	67.7	59.3	54.2	52.1	41.3	38.1
Lakshadweep	75.4	76.9	64.0	51.8	38.6	43.1
Pondicherry	72.9	64.4	57.4	47.1	36.0	34.8
All India	81.6	74.0	67.0	62.1	51.0	46.4

Source: Calculated by the authors using Census of India, 1971-2011 and projected data of Registrar General of India (RGI) for 2021

Table 4: Old Dependency Ratio (%), India 1971-2021

State	1971	1981	1991	2001	2011	2021
Andhra Pradesh	12.0	11.5	11.2	12.6	15.5	18.0
Arunachal Pradesh	8.1	8.5	7.6	8.3	7.7	12.5
Assam	9.7	NA	9.5	10.3	11.1	13.4
Bihar	11.4	12.2	11.5	13.0	14.2	13.3
Chhattisgarh	NA	NA	NA	13.0	13.1	16.0
Goa	12.0	11.7	10.7	12.5	16.8	21.7
Gujarat	10.2	10.1	10.8	11.5	12.7	16.4
Haryana	12.1	12.1	14.3	13.3	14.1	13.8
Himachal Pradesh	13.9	13.9	14.1	15.1	16.1	17.1
Jammu & Kashmir	10.8	10.8	10.0	11.6	12.5	14.7
Jharkhand	NA	NA	NA	10.8	12.7	14.1
Karnataka	11.8	11.6	11.8	12.7	14.8	18.2
Kerala	11.4	13.2	14.4	16.5	19.6	25.2
Madhya Pradesh	11.5	11.1	11.9	13.1	13.4	13.5
Maharashtra	10.7	11.5	11.9	14.8	15.7	16.9
Manipur	11.9	10.7	10.3	11.1	11.2	15.1
Meghalaya	9.0	8.3	8.2	8.6	8.5	10.7
Mizoram	NA	10.5	8.5	9.3	10.2	13.3
Nagaland	12.1	10.4	9.1	7.7	8.6	12.2
Orissa	11.7	11.5	12.3	14.1	15.5	16.6
Punjab	14.7	14.0	13.3	15.2	16.2	16.9
Rajasthan	11.1	10.3	11.4	12.8	13.0	13.6
Sikkim	5.7	7.8	8.1	9.0	10.1	13.1
Tamil Nadu	10.1	10.9	11.9	13.9	15.8	22.0
Tripura	13.4	13.2	12.4	12.3	12.2	15.2
Uttar Pradesh	13.3	12.8	12.6	13.6	13.8	13.1
Uttarakhand	NA	NA	NA	13.8	14.9	14.8
West Bengal	10.4	9.7	10.4	11.9	13.2	16.4
Andaman & Nicobar Islands	4.4	5.0	5.7	8.3	9.7	19.1
Chandigarh	5.9	6.4	6.9	9.0	9.3	24.7
Dadra & Nagar Haveli	8.1	7.5	7.5	9.6	6.3	14.4
Daman and Diu	NA	NA	10.5	10.9	6.4	17.6
Delhi	7.5	7.5	7.6	8.4	10.4	14.4
Lakshadweep	9.4	9.1	9.0	11.3	12.4	16.2
Pondicherry	11.7	11.8	11.7	12.5	14.5	19.4
All India	11.5	11.6	11.8	13.1	14.2	15.8

Source: Same as Table 3

Table 5: Total Dependency (Young and Old) Ratio (%), India 1971-2021

State	1971	1981	1991	2001	2011	2021
Andhra Pradesh	88.9	82.1	73.1	65.8	56.0	54.3
Arunachal Pradesh	75.2	79.1	78.5	81.6	67.5	68.7
Assam	106.5	NA	79.2	76.4	65.4	62.9
Bihar	94.4	93.8	89.4	95.1	91.1	75.9
Chhattisgarh	NA	NA	NA	79.2	66.4	52.3
Goa	80.9	72.3	68.5	49.4	49.4	48.4
Gujarat	94.8	81.9	75.3	66.0	58.6	55.7
Haryana	110.2	92.5	91.0	77.0	62.3	54.5
Himachal Pradesh	93.7	103.2	81.5	67.0	56.6	59.0
Jammu & Kashmir	94.0	87.8	72.1	73.9	70.1	58.8
Jharkhand	NA	NA	NA	84.0	76.5	72.3
Karnataka	95.3	86.3	74.4	65.6	55.6	54.4
Kerala	88.0	76.2	64.3	57.6	56.3	51.2
Madhya Pradesh	99.0	90.0	85.6	84.3	70.6	67.2
Maharashtra	89.9	78.8	72.7	69.1	57.8	54.2
Manipur	94.5	82.5	73.1	65.0	59.4	56.2
Meghalaya	93.0	88.2	76.9	88.4	80.1	75.2
Mizoram	NA	100.0	72.2	69.1	63.2	64.6
Nagaland	80.4	85.2	69.4	70.2	65.4	63.2
Orissa	94.7	86.0	76.7	70.9	62.3	59.6
Punjab	96.7	81.8	76.0	67.9	56.1	57.1
Rajasthan	99.4	93.8	88.1	88.2	73.1	56.0
Sikkim	72.0	78.5	75.6	67.9	51.3	60.2
Tamil Nadu	77.8	71.3	63.3	55.9	51.6	51.1
Tripura	103.2	86.6	78.4	69.3	55.3	55.2
Uttar Pradesh	94.6	96.3	89.4	92.6	77.8	77.0
Uttarakhand	NA	NA	NA	79.1	66.7	71.8
West Bengal	94.7	80.3	72.9	67.8	55.4	57.0
Andaman & Nicobar Islands	68.3	74.1	59.2	54.6	45.1	57.5
Chandigarh	62.4	59.7	51.7	45.9	46.2	57.5
Dadra & Nagar Haveli	98.2	86.8	69.1	77.0	54.9	72.1
Daman and Diu	NA	NA	66.1	54.4	37.6	54.1
Delhi	75.2	66.8	61.8	60.5	51.7	52.5
Lakshadweep	84.8	86.0	73.1	63.1	51.0	59.3
Pondicherry	84.6	76.2	69.1	59.6	50.6	54.3
All India	93.1	85.6	78.7	75.2	65.2	62.2

Source: Same as Table 3

Table 6: Classification of States into dividend and dependent on the basis of the Dependency Ratio, 1971 to 2021

State	1971	State	1981	State	1991	State	2001	State	2011	State	2021
Haryana	110.2	Himachal Pradesh	103.2	Haryana	91.0	Bihar	95.1	Bihar	91.1	Uttar Pradesh	77.0
Assam	106.5	Mizoram	100.0	Bihar	89.4	Uttar Pradesh	92.6	Meghalaya	80.1	Bihar	75.9
Tripura	103.2	Uttar Pradesh	96.3	Uttar Pradesh	89.4	Meghalaya	88.4	Uttar Pradesh	77.8	Meghalaya	75.2
Rajasthan	99.4	Bihar	93.8	Rajasthan	88.1	Rajasthan	88.2	Jharkhand	76.5	Jharkhand	72.3
Madhya Pradesh	99.0	Rajasthan	93.8	Madhya Pradesh	85.6	Madhya Pradesh	84.3	Rajasthan	73.1	Dadra & Nagar Haveli	72.1
Dadra & Nagar Haveli	98.2	Haryana	92.5	Himachal Pradesh	81.5	Jharkhand	84.0	Madhya Pradesh	70.6	Uttarakhand	71.8
Punjab	96.7	Madhya Pradesh	90.0	Assam	79.2	Arunachal Pradesh	81.6	Jammu & Kashmir	70.1	Arunachal Pradesh	68.7
Karnataka	95.3	Meghalaya	88.2	**All India**	**78.7**	Chhattisgarh	79.2	Arunachal Pradesh	67.5	Madhya Pradesh	67.2
Gujarat	94.8	Jammu & Kashmir	87.8	Arunachal Pradesh	78.5	Uttarakhand	79.1	Uttarakhand	66.7	Mizoram	64.6
Orissa	94.7	Dadra & Nagar Haveli	86.8	Tripura	78.4	Haryana	77.0	Chhattisgarh	66.4	Nagaland	63.2
West Bengal	94.7	Tripura	86.6	Meghalaya	76.9	Dadra & Nagar Haveli	77.0	Assam	65.4	Assam	62.9
Uttar Pradesh	94.6	Karnataka	86.3	Orissa	76.7	Assam	76.4	Nagaland	65.4	**All India**	**62.2**
Manipur	94.5	Orissa	86.0	Punjab	76.0	**All India**	**75.2**	**All India**	**65.2**	Sikkim	60.2
Bihar	94.4	Lakshadweep	86.0	Sikkim	75.6	Jammu & Kashmir	73.9	Mizoram	63.2	Orissa	59.6
Jammu & Kashmir	94.0	**All India**	**85.6**	Gujarat	75.3	Orissa	70.9	Haryana	62.3	Lakshadweep	59.3
Himachal Pradesh	93.7	Nagaland	85.2	Karnataka	74.4	Nagaland	70.2	Orissa	62.3	Himachal Pradesh	59.0
All India	**93.1**	Manipur	82.5	Andhra Pradesh	73.1	Tripura	69.3	Manipur	59.4	Jammu & Kashmir	58.8
Meghalaya	93.0	Andhra Pradesh	82.1	Manipur	73.1	Maharashtra	69.1	Gujarat	58.6	Andaman & Nicobar Islands	57.5
Maharashtra	89.9	Gujarat	81.9	Lakshadweep	73.1	Mizoram	69.1	Maharashtra	57.8	Chandigarh	57.5
Andhra Pradesh	88.9	Punjab	81.8	West Bengal	72.9	Punjab	67.9	Himachal Pradesh	56.6	Punjab	57.1
Kerala	88.0	West Bengal	80.3	Maharashtra	72.7	Sikkim	67.9	Kerala	56.3	West Bengal	57.0
Lakshadweep	84.8	Arunachal Pradesh	79.1	Mizoram	72.2	West Bengal	67.8	Punjab	56.1	Manipur	56.2
Pondicherry	84.6	Maharashtra	78.8	Jammu & Kashmir	72.1	Himachal Pradesh	67.0	Andhra Pradesh	56.0	Rajasthan	56.0
Goa	80.9	Sikkim	78.5	Nagaland	69.4	Gujarat	66.0	Karnataka	55.6	Gujarat	55.7
Nagaland	80.4	Kerala	76.2	Dadra & Nagar Haveli	69.1	Andhra Pradesh	65.8	West Bengal	55.4	Tripura	55.2
Tamil Nadu	77.8	Pondicherry	76.2	Pondicherry	69.1	Karnataka	65.6	Tripura	55.3	Haryana	54.5
Arunachal Pradesh	75.2	Andaman & Nicobar Islands	74.1	Goa	68.5	Manipur	65.0	Dadra & Nagar Haveli	54.9	Karnataka	54.4
Delhi	75.2	Goa	72.3	Daman and Diu	66.1	Lakshadweep	63.1	Delhi	51.7	Andhra Pradesh	54.3
Sikkim	72.0	Tamil Nadu	71.3	Kerala	64.3	Delhi	60.5	Tamil Nadu	51.6	Pondicherry	54.3
Andaman & Nicobar Islands	68.3	Delhi	66.8	Tamil Nadu	63.3	Pondicherry	59.6	Sikkim	51.3	Maharashtra	54.2
Chandigarh	62.4	Chandigarh	59.7	Delhi	61.8	Kerala	57.6	Lakshadweep	51.0	Daman and Diu	54.1
				Andaman & Nicobar Islands	59.2	Tamil Nadu	55.9	Pondicherry	50.6	Delhi	52.5
				Chandigarh	51.7	Andaman & Nicobar Islands	54.6	Goa	49.4	Chhattisgarh	52.3
						Daman and Diu	54.4	Chandigarh	46.2	Kerala	51.2
						Goa	49.4	Andaman & Nicobar Islands	45.1	Tamil Nadu	51.1
						Chandigarh	45.9	Daman and Diu	37.6	Goa	48.4

Source: Compiled by the authors

Table 8: Quality adjusted quantum migration for all migrants using Human Capital as quality.

Quality based on Human Capital/Education (All Migrants)					
Major Indian State (Urban)	Quality Unadjusted	Quality Adjusted Relative Position			
		Edu1	Edu2	Edu3	Illiterate
Andhra Pradesh	0.75	0.68	0.52	0.34	0.85
Bihar	0.65	0.69	0.31	0.16	**1.00**
Chhattisgarh	0.85	0.89	0.33	0.15	0.76
Delhi	0.80	0.71	**1.00**	**1.00**	0.42
Gujarat	0.68	0.88	0.54	0.36	0.62
Haryana	0.78	0.73	0.76	0.32	0.68
Himachal Pradesh	**1.00**	0.77	0.96	0.40	0.51
Jammu & Kashmir	0.35	0.73	0.68	0.31	0.72
Jharkhand	0.47	0.80	0.40	0.23	0.81
Karnataka	0.61	0.78	0.63	0.33	0.69
Kerala	0.65	**1.00**	0.83	0.51	0.30
Madhya Pradesh	0.63	0.88	0.33	0.27	0.74
Maharashtra	0.79	0.82	0.79	0.50	0.52
Orissa	0.83	0.85	0.33	0.31	0.77
Punjab	0.71	0.72	0.85	0.48	0.61
Rajasthan	0.68	0.73	0.32	0.30	0.90
Tamil Nadu	0.46	0.87	0.69	0.45	0.53
Uttar Pradesh	0.58	0.71	0.42	0.29	0.88
Uttaranchal	0.91	0.78	0.58	0.49	0.68
West Bengal	0.66	0.94	0.39	0.36	0.62

Source: Calculated by the authors using NSSO 2007-08

Edu1: Literate without any schooling; literate without formal schooling which includes literate through NFEC/AIEP; literate through TLC/AEC; others; literate with formal schooling includes EGS, below primary, primary, upper primary/middle.
Edu2: Secondary, higher-secondary, diploma/certificate course.
Edu3: Graduate, post-graduate and above.

Table 9: Quality adjusted quantum migration for inter-state migrants Human Capital as quality

Quality based on Human Capital/Education (Inter-State Migrants)					
Major Indian States (Urban)	Quality Unadjusted	Quality Adjusted Relative Position			
		Edu1	Edu2	Edu3	Illiterate
Andhra Pradesh	0.08	0.68	0.71	0.56	0.73
Bihar	0.07	0.52	0.65	0.63	0.91
Chhattisgarh	0.44	0.66	0.54	0.33	0.93
Delhi	**1.00**	0.74	0.91	0.72	0.48
Gujarat	0.27	**1.00**	0.70	0.52	0.39
Haryana	0.63	0.68	0.64	0.55	0.77
Himachal Pradesh	0.40	0.90	0.73	0.40	0.53
Jammu & Kashmir	0.11	0.64	0.49	0.31	0.99
Jharkhand	0.22	0.82	0.90	0.52	0.46
Karnataka	0.26	0.60	**1.00**	**1.00**	0.47
Kerala	0.10	0.92	0.89	0.88	0.24
Madhya Pradesh	0.15	0.71	0.51	0.53	0.83
Maharashtra	0.37	0.79	0.89	0.70	0.45
Orissa	0.18	0.83	0.53	0.77	0.60
Punjab	0.43	0.74	0.67	0.61	0.66
Rajasthan	0.17	0.62	0.58	0.40	0.92
Tamil Nadu	0.07	0.82	0.93	0.95	0.30
Uttar Pradesh	0.12	0.49	0.56	0.65	**1.00**
Uttaranchal	0.87	0.65	0.59	0.57	0.83
West Bengal	0.20	0.83	0.45	0.64	0.69

Source: Source: Same as Table 8

Table 10: Quality adjusted Quantum Migration using Distance as Quality

Quality based on Distance			
Major Indian States (Urban)	Quality Unadjusted	Quality Adjusted Relative Position	
	All Migrants	Inter-State	Intra-State
Andhra Pradesh	0.75	0.05	0.99
Bihar	0.65	0.04	**1.00**
Chhattisgarh	0.85	0.16	0.90
Delhi	0.80	**1.00**	0.22
Gujarat	0.68	0.16	0.90
Haryana	0.78	0.39	0.72
Himachal Pradesh	**1.00**	0.14	0.92
Jammu & Kashmir	0.35	0.07	0.98
Jharkhand	0.47	0.12	0.94
Karnataka	0.61	0.18	0.89
Kerala	0.65	0.10	0.95
Madhya Pradesh	0.63	0.10	0.96
Maharashtra	0.79	0.20	0.87
Orissa	0.83	0.06	0.99
Punjab	0.71	0.28	0.81
Rajasthan	0.68	0.12	0.94
Tamil Nadu	0.46	0.08	0.97
Uttar Pradesh	0.58	0.09	0.97
Uttaranchal	0.91	0.39	0.72
West Bengal	0.66	0.10	0.96

Source: Source: Same as Table 8

Table 11: Quality adjusted Quantum Migration with Origin as Quality

Quality based on Origin						
	All Migrants			Inter-State Migrants		
	Quality Unadjusted	Quality Adjusted Relative Position		Quality Unadjusted	Quality Adjusted Relative Position	
Major Indian States (urban)		Urban Origin	Rural Origin		Urban Origin	Rural Origin
Andhra Pradesh	0.75	0.40	0.92	0.08	0.66	0.77
Bihar	0.65	0.23	**1.00**	0.07	0.63	0.79
Chhattisgarh	0.85	0.32	0.96	0.44	0.48	0.90
Delhi	0.80	**1.00**	0.66	**1.00**	0.44	0.93
Gujarat	0.68	0.46	0.90	0.27	0.34	**1.00**
Haryana	0.78	0.45	0.90	0.63	0.45	0.92
Himachal Pradesh	**1.00**	0.40	0.92	0.40	0.93	0.57
Jammu & Kashmir	0.35	0.36	0.94	0.11	0.74	0.71
Jharkhand	0.47	0.40	0.92	0.22	0.78	0.68
Karnataka	0.61	0.58	0.85	0.26	0.81	0.66
Kerala	0.65	0.53	0.87	0.10	0.99	0.52
Madhya Pradesh	0.63	0.45	0.90	0.15	0.62	0.80
Maharashtra	0.79	0.64	0.82	0.37	0.52	0.87
Orissa	0.83	0.28	0.97	0.18	0.87	0.61
Punjab	0.71	0.65	0.81	0.43	0.53	0.86
Rajasthan	0.68	0.35	0.95	0.17	0.59	0.82
Tamil Nadu	0.46	0.70	0.79	0.07	**1.00**	0.52
Uttar Pradesh	0.58	0.38	0.93	0.12	0.67	0.76
Uttaranchal	0.91	0.65	0.81	0.87	0.79	0.67
West Bengal	0.66	0.46	0.90	0.20	0.52	0.87

Source: Same as Table 8

Table 12: Share of Population, Chid and Elderly Population, Dependency Ratio and Median Age, 2011

State	Share of Population	Child Population (%)	Elderly Population (%)	Total Dependency Ratio	Median Age
Andhra Pradesh	4.5	25.8	9.8	56.0	25.2
Arunachal Pradesh	0.1	47.0	4.6	67.5	20.2
Assam	2.6	32.8	6.7	65.4	20.3
Bihar	8.7	40.1	7.4	91.1	20.2
Chhattisgarh	2.1	32.0	7.8	66.4	20.3
Goa	0.1	21.8	11.2	49.4	30.2
Gujarat	5.1	28.9	7.9	58.6	25.2
Haryana	2.1	29.7	8.7	62.4	25.2
Himachal Pradesh	0.6	25.9	10.2	56.6	25.1
Jammu & Kashmir	1.1	33.8	7.4	70.1	20.1
Jharkhand	2.8	36.1	7.1	76.5	20.2
Karnataka	5.1	26.2	9.5	55.6	25.2
Kerala	2.8	23.4	12.6	56.3	30.2
Madhya Pradesh	6.1	33.5	7.9	70.6	20.3
Maharashtra	9.4	26.6	9.9	57.8	25.2
Manipur	0.2	30.2	7.0	59.4	25.1
Meghalaya	0.2	39.7	4.7	80.1	15.3
Mizoram	0.1	32.5	6.3	63.2	20.3
Nagaland	0.2	34.3	5.2	65.4	20.2
Odisha	3.5	28.8	9.5	62.3	25.2
Punjab	2.3	25.5	10.3	56.1	25.1
Rajasthan	5.8	34.6	7.5	73.1	25.3
Sikkim	0.1	27.2	6.7	51.3	25.1
Tamil Nadu	6.1	23.6	10.4	51.6	30.1
Telangana	2.7	27.1	9.2	57.1	25.0
Tripura	0.3	27.7	7.9	55.3	20.4
Uttar Pradesh	16.8	35.7	7.7	77.8	20.2
Uttarakhand	0.8	31.0	8.9	66.7	25.0
West Bengal	7.7	27.1	8.5	55.4	20.4

Source: Calculated by the authors using Census 2011 data

Table 13: Share of Population adjusted with a different dimension of population, using Arithmetic mean (AM) and Geometric Mean (GM) in 1971

State	Share of Population	Child Population		Elderly Population		Dependency Ratio		Median Age	
		AM	GM	AM	GM	AM	GM	AM	GM
Andhra Pradesh	7.9	6.9	6.5	7.0	6.8	6.6	5.7	8.3	7.1
Arunachal Pradesh	0.1	0.6	0.4	0.1	0.2	0.1	0.2	4.3	3.8
Assam	2.7	3.9	5.6	2.2	1.1	3.9	5.1	1.5	3.0
Bihar	10.3	9.0	8.6	8.6	6.6	8.6	7.7	9.4	8.3
Gujarat	4.5	5.2	7.0	4.1	4.1	5.4	6.9	3.0	4.1
Haryana	1.8	3.1	4.4	2.1	2.7	3.4	4.3	1.1	2.6
Himachal Pradesh	0.6	1.5	2.0	1.9	2.3	1.6	1.9	4.5	4.4
Jammu& Kashmir	0.8	1.9	2.5	1.2	1.7	1.8	2.2	4.6	4.7
Karnataka	5.3	5.2	6.2	4.9	5.2	5.1	5.6	2.9	3.4
Kerala	3.9	3.8	4.5	3.9	4.6	3.6	3.8	6.2	5.5
Madhya Pradesh	7.6	7.1	8.0	6.5	5.5	6.9	7.3	4.1	4.4
Maharashtra	10.8	8.2	1.9	16.0	22.7	10.6	12.2	13.9	10.5
Manipur	0.2	1.3	1.1	1.0	0.9	1.4	1.0	0.3	1.4
Meghalaya	0.2	1.5	1.1	0.2	0.3	1.3	0.9	0.3	1.5
Nagaland	0.1	0.6	0.4	1.2	0.6	0.4	0.3	4.3	3.7
Odisha	4.0	4.2	5.3	3.9	4.4	4.1	4.8	2.3	2.9
Punjab	2.5	2.9	3.9	3.4	4.8	3.0	3.9	1.5	2.1
Rajasthan	4.7	5.0	6.4	4.1	3.8	4.9	5.8	2.6	3.4
Tamil Nadu	7.5	6.1	4.5	6.4	5.3	5.6	2.2	8.1	6.6
Tripura	0.3	1.6	1.5	1.3	1.3	1.9	1.5	0.3	1.7
Uttar Pradesh	16.1	13.3	10.3	13.5	10.7	12.9	9.8	12.5	10.5
West Bengal	8.1	7.3	7.8	6.6	4.4	7.0	6.7	4.3	4.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Calculated by the authors using Census 1971 data

Table 14: Share of Population adjusted with a different dimension of population, using Arithmetic mean (AM) and Geometric Mean (GM) in 2011

State	Share of Population	Child Population		Elderly Population		Dependency Ratio		Median Age	
		AM	GM	AM	GM	AM	GM	AM	GM
Andhra Pradesh	4.5	2.6	3.3	4.2	5.3	3.5	3.3	4.4	5.2
Arunachal Pradesh	0.1	6.2	1.1	9.1	1.9	1.8	0.7	1.1	0.5
Assam	2.6	3.7	4.2	2.2	2.6	3.1	3.9	2.4	2.9
Bihar	8.7	7.7	9.9	6.5	5.5	9.2	11.2	5.6	5.2
Chhattisgarh	2.1	3.3	3.7	2.2	2.9	2.9	3.6	2.2	2.6
Goa	0.1	0.1	0.1	1.6	0.9	0.1	0.2	3.0	0.9
Gujarat	5.1	3.6	4.7	4.1	4.6	4.0	4.1	4.7	5.6
Haryana	2.1	2.7	3.2	2.4	3.3	2.5	3.1	3.1	3.6
Himachal Pradesh	0.6	1.2	1.2	1.7	1.9	1.1	1.2	2.3	1.9
Jammu &Kashmir	1.1	3.3	2.8	1.4	1.9	2.5	2.8	1.6	1.8
Jharkhand	2.8	4.5	4.9	2.4	2.9	4.2	5.1	2.5	3.0
Karnataka	5.1	3.0	3.8	4.5	5.6	3.9	3.4	4.7	5.6
Kerala	2.8	1.5	1.7	3.7	5.2	2.4	2.7	4.5	5.1
Madhya Pradesh	6.1	5.1	6.7	4.8	5.0	5.7	6.7	4.3	4.4
Maharashtra	9.4	4.7	5.3	7.5	7.8	6.7	5.4	7.0	7.7
Manipur	0.2	2.2	1.1	0.7	0.8	1.1	0.9	2.1	1.1
Meghalaya	0.2	4.5	1.6	0.2	0.2	2.9	1.5	0.2	0.2
Mizoram	0.1	2.7	0.6	0.5	0.4	1.3	0.6	1.1	0.4
Nagaland	0.2	3.1	1.0	0.3	0.4	1.6	0.9	1.1	0.7
Odisha	3.5	3.0	3.9	3.5	4.6	3.4	4.0	3.9	4.7
Punjab	2.3	1.8	2.3	2.9	4.0	2.1	2.4	3.2	3.8
Rajasthan	5.8	5.3	6.8	4.5	4.5	5.8	6.9	5.0	5.9
Sikkim	0.1	1.3	0.2	0.5	0.2	0.3	0.1	2.0	0.3
Tamil Nadu	6.1	2.7	2.6	5.4	6.6	4.2	2.4	6.1	7.5
Telangana	2.7	2.3	3.0	2.9	3.9	2.4	2.8	3.4	4.0
Tripura	0.3	1.6	1.0	0.9	1.1	0.8	0.8	1.2	1.0
Uttar Pradesh	16.8	9.6	12.0	11.9	7.9	13.0	12.9	9.8	7.2
Uttarakhand	0.8	2.6	2.2	1.6	2.1	2.1	2.3	2.4	2.2
West Bengal	7.7	4.1	5.1	5.9	6.0	5.4	4.1	5.1	5.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Same as Table 12

Table 15: Proposed weights based on population size adjusted with multiple dimension of population, 1971 and 2011

State	Weights based on share of Population 2011	Multiple Dimensions Adjustments, 2011		Weights based on share of Population, 1971	Multiple Dimensions Adjustments, 1971	
		Arithmetic Weight	Geometric Weight		Arithmetic Weight	Geometric Weight
Andhra Pradesh	4.5	3.0	3.8	7.9	4.8	7.5
Arunachal Pradesh	0.1	4.7	1.7	0.1	3.0	0.6
Assam	2.6	3.3	3.7	2.7	5.3	2.3
Bihar	8.7	6.5	6.5	10.3	5.9	8.5
Chhattisgarh	2.1	3.2	3.8	N.A	N.A	N.A
Goa	0.1	1.8	0.4	N.A	N.A	N.A
Gujarat	5.1	3.5	4.3	4.5	4.4	5.9
Haryana	2.1	3.2	4.1	1.8	2.8	3.3
Himachal Pradesh	0.6	2.2	2.6	0.6	4.5	5.3
Jammu & Kashmir	1.1	3.3	3.4	0.8	4.9	4.9
Jharkhand	2.8	4.2	4.5	N.A	N.A	N.A
Karnataka	5.1	3.2	3.9	5.3	3.6	4.1
Kerala	2.8	2.9	3.5	3.9	4.8	6.2
Madhya Pradesh	6.1	4.4	5.1	7.6	9.3	4.3
Maharashtra	9.4	4.3	4.9	10.8	7.9	10.0
Manipur	0.2	2.6	2.2	0.2	1.5	2.0
Meghalaya	0.2	3.7	0.9	0.2	2.4	1.0
Mizoram	0.1	2.6	1.6	N.A	N.A	N.A
Nagaland	0.2	2.9	1.6	0.1	3.4	2.1
Odisha	3.5	3.4	4.6	4.0	2.8	3.9
Punjab	2.3	2.5	3.4	2.5	3.0	3.9
Rajasthan	5.8	5.0	5.8	4.7	4.7	3.7
Sikkim	0.1	1.9	0.8	N.A	N.A	N.A
Tamil Nadu	6.1	3.3	3.2	7.5	4.1	4.2
Telangana	2.7	2.8	3.7	N.A	N.A	N.A
Tripura	0.3	1.8	1.9	0.3	6.1	2.5
Uttar Pradesh	16.8	7.2	6.7	16.1	7.1	10.1
Uttarakhand	0.8	3.2	3.7	N.A	N.A	N.A
West Bengal	7.7	3.4	3.7	8.1	3.7	3.8
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Calculated by the authors using Census 1971 and 2011 data; NA – Not Applicable

Table 16: Alternative weights based on both population size and fraction, 1971

State	Share of Population	Population (million)	Weights based on Population size	Alternative Weight (Weights based on both size, and fraction)
Andhra Pradesh	7.9	43.5	7.9	7.0
Arunachal Pradesh	0.1	0.5	0.1	0.7
Assam	2.7	15.0	2.7	3.9
Bihar	10.3	56.3	10.3	8.2
Gujarat	4.5	24.7	4.5	5.1
Haryana	1.8	10.0	1.8	3.2
Himachal Pradesh	0.6	3.5	0.6	1.8
Jammu & Kashmir	0.8	4.6	0.8	2.1
Karnataka	5.3	29.3	5.3	5.6
Kerala	3.9	21.3	3.9	4.7
Madhya Pradesh	7.6	41.7	7.6	6.8
Maharashtra	10.8	59.0	10.8	8.4
Manipur	0.2	1.1	0.2	1.0
Meghalaya	0.2	1.0	0.2	1.0
Nagaland	0.1	0.5	0.1	0.7
Odisha	4.0	21.9	4.0	4.8
Punjab	2.5	13.5	2.5	3.7
Rajasthan	4.7	25.8	4.7	5.2
Tamil Nadu	7.5	41.2	7.5	6.8
Tripura	0.3	1.6	0.3	1.2
Uttar Pradesh	16.1	88.3	16.1	10.8
West Bengal	8.1	44.2	8.1	7.1

Source: Calculated by the authors using Census 1971 data

Table 17: Alternative Weights based on both Population Size and Fraction, 2011

State	Share of Population	Population (million)	Weights based on Population size	Alternative Weight (Weights based on both size, and fraction)
Andhra Pradesh	4.5	53.4	4.5	4.6
Arunachal Pradesh	0.1	1.4	0.1	0.7
Assam	2.6	31.2	2.6	3.4
Bihar	8.7	104.1	8.7	6.7
Chhattisgarh	2.1	25.5	2.1	3.1
Goa	0.1	1.5	0.1	0.7
Gujarat	5.1	60.4	5.1	4.9
Haryana	2.1	25.4	2.1	3.1
Himachal Pradesh	0.6	6.9	0.6	1.6
Jammu & Kashmir	1.1	12.5	1.1	2.1
Jharkhand	2.8	33.0	2.8	3.5
Karnataka	5.1	61.1	5.1	4.9
Kerala	2.8	33.4	2.8	3.6
Madhya Pradesh	6.1	72.6	6.1	5.4
Maharashtra	9.4	112.4	9.4	7.0
Manipur	0.2	2.9	0.2	1.0
Meghalaya	0.2	3.0	0.2	1.0
Mizoram	0.1	1.1	0.1	0.6
Nagaland	0.2	2.0	0.2	0.8
Odisha	3.5	42.0	3.5	4.0
Punjab	2.3	27.7	2.3	3.2
Rajasthan	5.8	68.5	5.8	5.3
Sikkim	0.1	0.6	0.1	0.5
Tamil Nadu	6.1	72.1	6.1	5.4
Telangana	2.6	31.2	2.6	3.4
Tripura	0.3	3.7	0.3	1.2
Uttar Pradesh	16.8	199.8	16.8	9.9
Uttarakhand	0.8	10.1	0.8	1.9
West Bengal	7.7	91.3	7.7	6.2

Source: Calculated by the authors using Census 2011 data

Table 18: Share of Population and proposed weights for resource allocation in India

State	Share of Population 2011	Multi-Dimensional Weight*	Alternative Weight* *
Andhra Pradesh	4.5	3.8	4.6
Arunachal Pradesh	0.1	1.7	0.7
Assam	2.6	3.7	3.4
Bihar	8.7	6.5	6.7
Chhattisgarh	2.1	3.8	3.1
Goa	0.1	0.4	0.7
Gujarat	5.1	4.3	4.9
Haryana	2.1	4.1	3.1
Himachal Pradesh	0.6	2.6	1.6
Jammu & Kashmir	1.1	3.4	2.1
Jharkhand	2.8	4.5	3.5
Karnataka	5.1	3.9	4.9
Kerala	2.8	3.5	3.6
Madhya Pradesh	6.1	5.1	5.4
Maharashtra	9.4	4.9	7.0
Manipur	0.2	2.2	1.0
Meghalaya	0.2	0.9	1.0
Mizoram	0.1	1.6	0.6
Nagaland	0.2	1.6	0.8
Odisha	3.5	4.6	4.0
Punjab	2.3	3.4	3.2
Rajasthan	5.8	5.8	5.3
Sikkim	0.1	0.8	0.5
Tamil Nadu	6.1	3.2	5.4
Telangana	2.7	3.7	3.4
Tripura	0.3	1.9	1.2
Uttar Pradesh	16.8	6.7	9.9
Uttarakhand	0.8	3.7	1.9
West Bengal	7.7	3.7	6.2

* based on Geometric Mean

**Weights based on both size, and fraction