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A Study on Inter-State Migration Patterns in India: Analysis Using Coefficient of Variation

KATSUMATA Yutaro

Assistant Professor, The Center for Contemporary India Studies at Hiroshima University; Research Fellow, National Institutes for the Humanities (NIHU), Japan
E-mail: ykatsumata18@gmail.com

Abstract This study attempts to clarify the characteristics of and changes in inter-state migration in India since economic liberalization. Specifically, the focus is on the spatial concentration patterns of migration, with the analysis based on the Census of India 1991 and 2011 data using the coefficient of variation (CV). As a result of the analysis, it was found that states with a high CV of in-migration and states with a high CV of out-migration have certain distinct regional characteristics. Looking at the changes between the two periods, it can be seen that the fundamental pattern of inter-state migration in 1991 persisted in 2011 as well. However, when the trends of each state were examined in detail, it was found that the western and southern states, which showed changes in in-migration patterns, and Delhi, which showed changes in its out-migration pattern, exhibited characteristic trends.

Key words inter-state migration, in-migration, out-migration, regional disparity, coefficient of variation, India

I. Introduction

Since the liberalization of the economy in 1991, India has been experiencing rapid economic growth. In this context, there have been major spatial changes, including increased urbanization, development of large cities, expansion of suburban spaces, formation of industrial areas, and strengthening of urban-rural connectivity (Okahashi, 2015a). In particular, "Mega-Regions," which are wide-area economic agglomerations with large cities at their core, have been attracting attention as new economic spaces (Okahashi, 2012).

However, the degree of economic growth varies from region to region, and the widening of regional disparities is confirmed. The Net State Domestic Product (NSDP) values confirm that the north-south and east-west[1] disparities largely coexist, with Northeast India in particular being economically backward (Tomozawa, 2018). In addition, the economic disparity has been widening by state (Okashi, 2009, 2015b). The northwestern states of Delhi, Haryana, Himachal Pradesh (HP), and Punjab, the western states of Gujarat and Maharashtra, and the southern states of Karnataka, Tamil Nadu, Kerala, and Andhra Pradesh have witnessed high economic growth. On the other hand, the "Hindi-belt"[2] states of Bihar, Uttar Pradesh (UP), and Madhya Pradesh (MP), along with Jharkhand, Orissa, Chandigarh, and Assam, have tended to stagnate. However, among the Hindi-belt states, Rajasthan, some areas of which form part of the National Capital Region (NCR) of Delhi, has been experiencing high growth.

Thus, since economic liberalization, India has undergone major restructuring of its land structure, which has also affected the patterns of internal migration. This study focuses on the spatial characteristics of and changes in inter-state migration. Inter-state migration is a phenomenon that has attracted attention in relation to the national land structure (Hino and Une, 2015). Although intra-state and rural-rural migration have been the dominant forms of migration in India, inter-state and rural-urban migration are also increasing, reflecting economic development and widening regional disparities (Bhagat and Keshri, 2020).

Some studies on migration in India have been conducted, and two major sources of data have been used for analysis (Shimane, 2020). The first is the Census of India data, which has been used by studies such as Bhagat and Keshri (2020). In addition, Kumar and Rai (2014), Bhagat and Mohanty (2009), and Bhagat (2018) analyze migration from the perspective of urbanization, and Mahapatro (2010) and Nishikawa (2015) examine it from the point of view of gender. Chen and Katsumata (2019) used census data from 1991 and 2001 to identify the characteristics of inter-state migration based on factor analysis, and Shimane (2020) examined migration by state based on 2011 data. As pointed out by Raman and Bhagat (2006), census data is the most important source of information for analyzing migration patterns in India.

The second source is the Employment and Unemployment Situation in India of the National Sample Survey.[3] This data is used because it is difficult for census data to capture temporary and seasonal migration patterns (Bhagat and Mohanty, 2009). Keshri and Bhagat (2013)

pointed out the importance of analyzing temporary and seasonal migration patterns, although studies are limited due to the lack of data. The data on labor migration from the National Sample Survey 64th Round shows that temporary and seasonal migration is about seven times higher than permanent migration. The data also shows that rural-urban migration is dominant, and is more prevalent among the poor and low-caste groups in rural areas, and more prevalent in regions in Central, Northern, and Eastern India, where economic development has been slow. Usami (2014) also used the same data to examine trends in rural out-migration.

However, the National Sample Survey data is disaggregated by origin and does not include information on the destination of migration (Keshri and Bhagat, 2013). Hence, it has the disadvantage of not including data on individual inter-state migration. This study, therefore, analyzed census data for 1991 and 2011 to identify the patterns of inter-state migration and changes thereof in India after economic liberalization because this data captures specific inter-state migration trends despite the limitations of not being able to adequately capture temporary and seasonal migration patterns.

Although there are various indicators for analyzing migration, this study attempted to analyze inter-state migration using the coefficient of variation (CV), referring to Rogers and Raymer (1998), Rogers and Sweeney (1998), and He and Pooler (2002). This is an indicator of the degree of regional concentration of migration flows and is considered to be simpler and more transparent than other similar indicators[4] (Rogers and Sweeney, 1998).

The remainder of this paper is organized as follows: In Section II, the details of the data and methods of analysis are explained. In Section III, the characteristics of migration by state in India are described. In Section IV, the characteristics of and changes in inter-state migration are analyzed using CV. Section V provides a summary of this paper.

II. Data and Research Methodology

The Census of India data is made available to the public by the Registrar General and Census Commissioner through the official website "Census Digital Library"[5] in several series (Kuwatsuka, 2017). Among these, migration data is included in the D series (Chen and Katsumata, 2019; Shimane, 2020).

Migration data is aggregated using two types of data[6]: (1) those based on place of birth and place of current residence,[7] and (2) those based on place of last residence and place of current residence. In this study, inter-state migration was analyzed using the data in (2). This data is included in the D series of the census, D-2 for 1991 and D-3 for 2011, and migration is enumerated by the place of last residence and the period of residence in the place of current residence.

The duration of residence in the place of current residence is classified into six categories: less than one year, one to four years, five to nine years, 10 to 19 years, more than 20 years, and unknown. However, it is important to know how to define migration. In this paper, migration is defined as a difference between the place of current residence and the place of last residence in the past five years or less. Therefore, this study used data on migration wherein the duration of residence in the place of current residence was less than one year or one to four years. This definition was chosen because it is often adopted in other countries (Ishikawa et al., 1998).

When comparing the census data of 1991 and 2011, it is necessary to note the change in the composition of the states. The number of states was 32 in 1991, but it increased to 35 in 2011, as three new states were carved out during 1991–2011. Specifically, Jharkhand was carved out from Bihar, Uttaranchal[8] from UP, and Chhattisgarh from MP in 2000. The data for 2011 was recounted according to the composition of the states in 1991, and the map data on state boundaries in 1991 was used for the analysis. Since there was no data for Jammu and Kashmir in 1991, the remaining 31 states were included in the analysis.

This study applied CV to the inter-state migration analysis. CV is a relative indicator of the degree of variation in the data and is calculated by dividing the standard deviation by the arithmetic mean. The value of CV is zero when there is no variation in the data, and the value increases as variation increases.

Based on the census data, two origin-destination (OD) tables were compiled for the in-migration and out-migration volume for the states (31 states × 31 states matrix). CVs were calculated based on the arithmetic mean and standard deviation of the in-migration and out-migration figures for each state. A large CV value indicates that the origin of in-migration or destination of out-migration is concentrated in a particular state. Conversely, if the value of CV is small, it means that the origin of in-migration or destination of out-migration is decentralized.

III. Overview of Migration by State

India's population increased from 846,421,039 in 1991

to 1,210,854,977 in 2011 (growth rate of 43.1%). During this period, the volume of internal migration, which is defined as a difference between the place of current residence and the place of last residence in the past five years or less, also increased from 46,224,498 to 80,707,372 (growth rate of 74.6%). It can be seen that the increase in internal migration was more significant than the population growth. The volume of inter-state migration was 6,636,868 in 1991, accounting for only 14.4% of the volume of internal migration. By 2011, the volume of inter-state migration had more than doubled to 13,521,489. Although intra-state migration was still dominant, the share of inter-state migration in total internal migration increased to 16.8%. As pointed out in previous studies, the importance of inter-state migration was increasing.

Figure 1 shows the volume of in-migration and out-migration by state in 2011. The states with the largest in-migration volume are Maharashtra (2,370,624), Gujarat (1,285,439), Delhi (1,221,655), Karnataka (985,790), Haryana (979,145), and UP (928,162). Of these, the top four states have metropolitan areas with populations of five million or more.[9] Specifically, Mumbai and Pune in Maharashtra, Ahmedabad in Gujarat, Delhi, and Bangalore in Karnataka fall under this category. It is noteworthy that the in-migration volume of Maharashtra is almost double that of Gujarat, which has the second largest volume. Haryana is part of the NCR, where industrial locations and housing development are underway. UP ranks sixth in terms of the in-migration volume, although it also shows a large excess of out-migration, as described below. This is partly due to the size of its population,[10] but it is also probably due to the fact that part of this state is included in the NCR.

On the other hand, the out-migration volume is overwhelmingly high in the two states of UP (2,931,695) and Bihar (2,078,122), as many people move out of these states for employment (Usami and Yanagisawa, 2015). These two states are followed by MP (864,722), Rajasthan (840,194), Maharashtra (779,442), and West Bengal (640,306). Except for Maharashtra and West Bengal, the other four states are located in the Hindi belt.

Next, the changes in migration by state between 1991

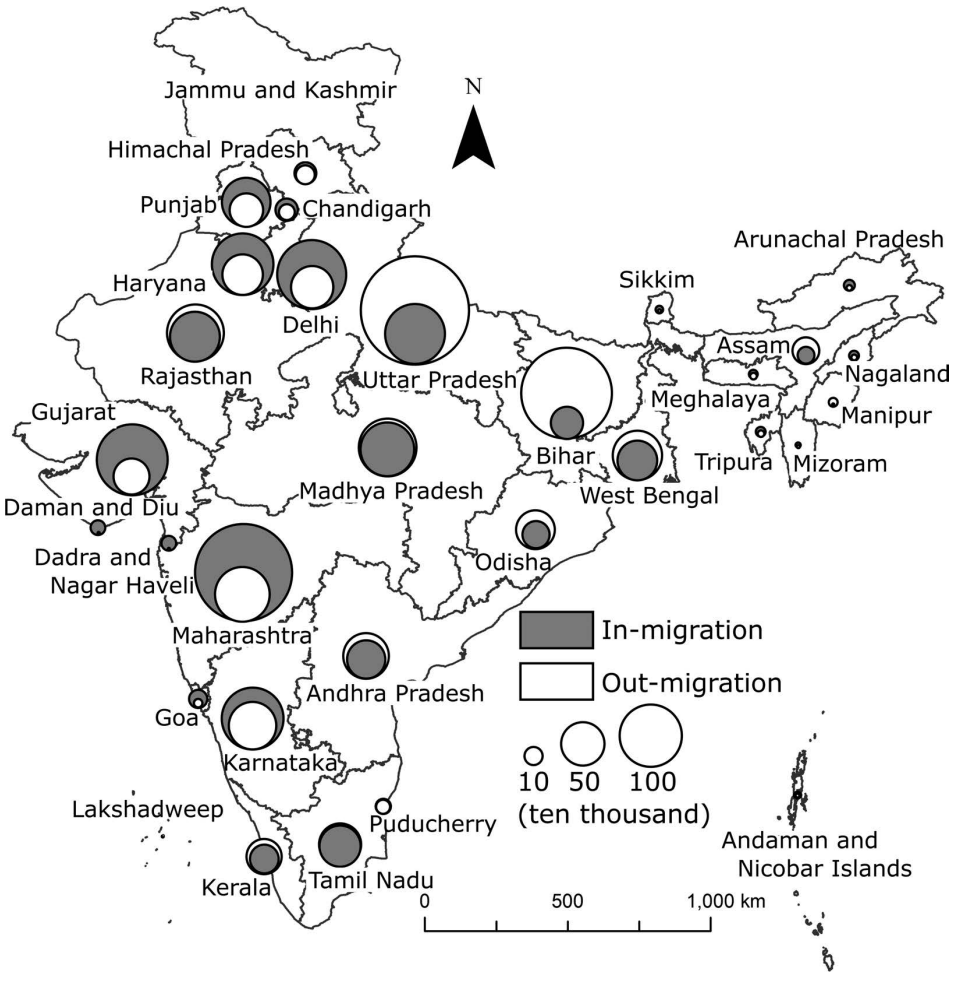

Figure 1. Volume of in-migration and out-migration by state (2011)
Note: Based on the composition of the states in 1991.
Source: Based on the Census of India 2011.

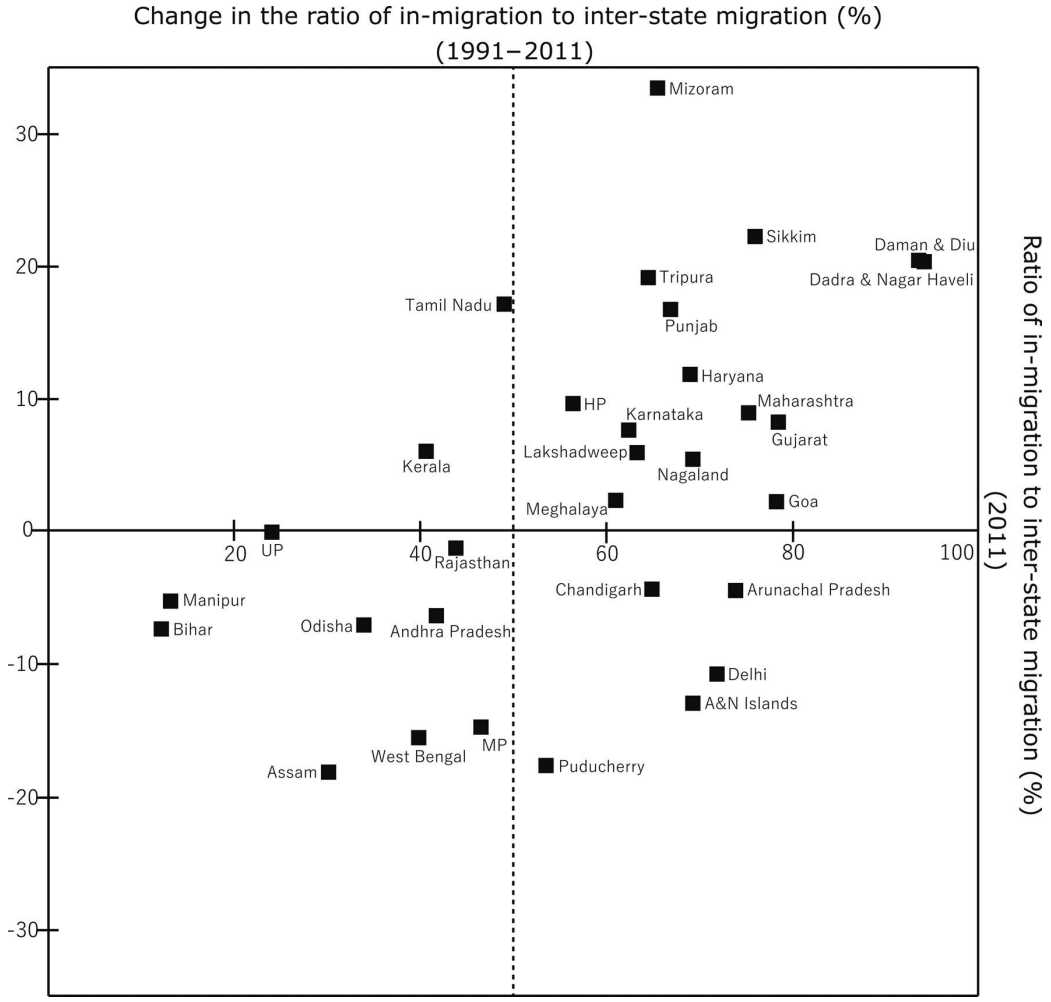

Figure 2. Ratio of in-migration to inter-state migration and changes thereof
Source: Based on the Census of India 1991 and 2011.

and 2011 were examined. Figure 2 shows the ratio of in-migration to total inter-state migration for each state in 2011 on the horizontal axis and the increase or decrease in the ratio of in-migration between 1991 and 2011 on the vertical axis. The 50% axis has been drawn at the center of the horizontal axis, so that the states with excess in-migration are located on the right side of this axis and the states with excess out-migration are located on the left side. As for the vertical axis, the states located above zero are those with an increase in the ratio of in-migration and the states below zero are those with a decrease.

Based on these two indicators, each state was placed in one of the four quadrants. Looking at the states with excess in-migration, it is obvious that the states in Western and Southern India and the states around Delhi, which have a high level of economic development, fall in this quadrant. Most of these states are located in the 1st quadrant, but Delhi is an exception. In other words, although Delhi showed an excess in-migration volume in 2011, the ratio of in-migration decreased compared to 1991. On the other hand, the states located in the Hindi belt witnessed excess out-migration. In addition, the three southern states of Andhra Pradesh, Kerala, and Tamil Nadu also experienced excess out-migration. While most of the states with excess out-migration fall in the 3rd quadrant, Kerala and Tamil Nadu show different trends due to the increase in the ratio of in-migration. Moreover, although UP accounted for the largest volume of out-migration, there was little change in the ratio of in-migration over 1991–2011.

IV. Characteristics of and Changes in Inter-State Migration

1. Changing migration patterns in India

Before examining the inter-state migration patterns, the national averages were calculated based on the CV of in-migration and out-migration by state, and the changes in migration patterns in India were confirmed. Given the large differences in the migration volume among the states, it is necessary to consider the magnitude of the differences. Therefore, the weighted average of the CV

(ACV) of in-migration and out-migration were calculated. In short, the weighted average of each state's ratio to India's total in-migration and out-migration were obtained.

Table 1 shows the ACV of in-migration, out-migration, and total inter-state migration in 1991 and 2011. Comparing the ACV of in-migration and out-migration, it can be seen that the former is consistently higher for both males and females. In addition, all ACV values declined over 1991–2011, suggesting that inter-state migration in India became more dispersed. On the other hand, one characteristic, although not fully discussed in this paper, was that ACV was higher in females than in males.

2. Changes in inter-state migration patterns by state

Based on the changes in the CV values, changes in the inter-state migration were clarified for each state. Figure 3 shows the change in the CV of in-migration on the horizontal axis and the change in the CV of out-migration on the vertical axis for the period 1991–2011. Based on these two indicators, each state can be placed into one of the four quadrants.

In the 1st quadrant are seven states for which both the

Table 1. Change in ACV of in-migration and out-migration (1991–2011)

	1991			2011		
	In-migration	Out-migration	Total migration	In-migration	Out-migration	Total migration
Male	2.23	1.95	4.18	2.14	1.90	4.04
Female	2.25	2.12	4.37	2.16	2.01	4.17
Total	2.22	2.01	4.23	2.12	1.92	4.04

Source: Based on the Census of India 1991 and 2011.

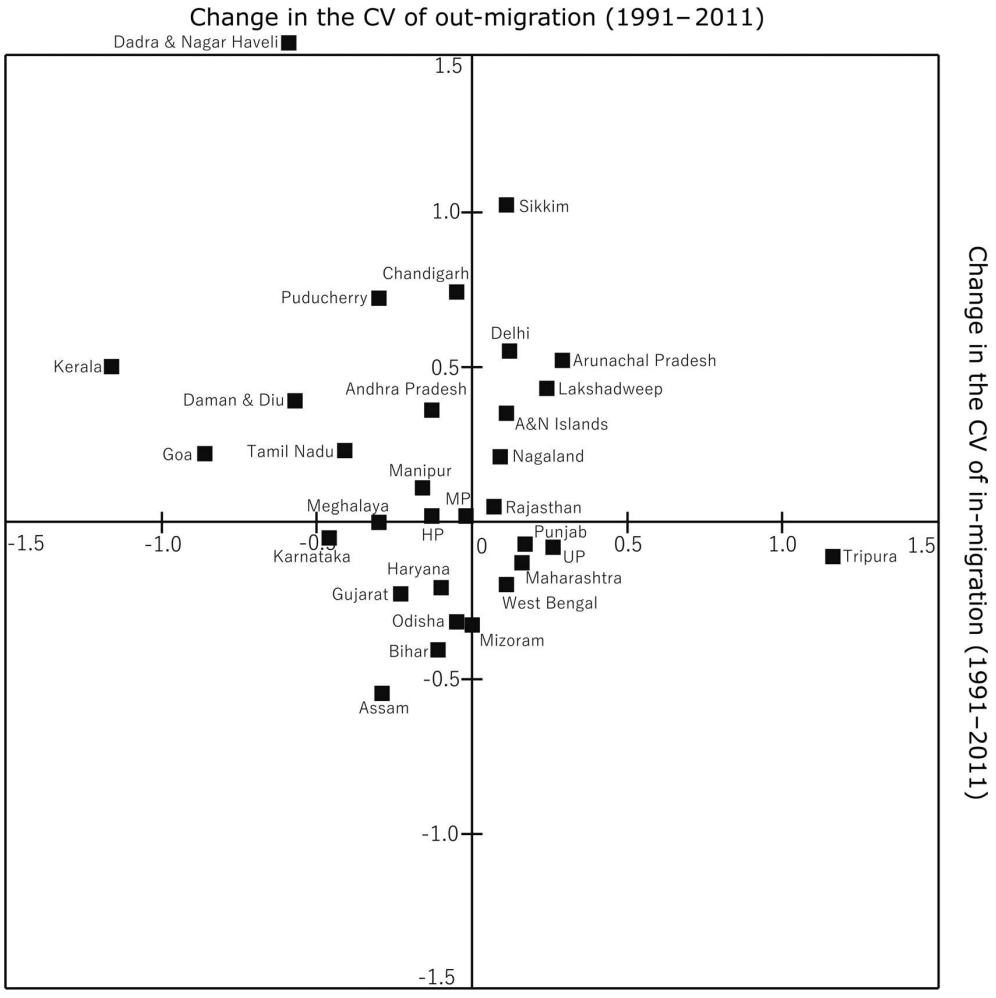

Figure 3. Change in CV of in-migration and out-migration by state (1991–2011)
Source: Based on the Census of India 1991 and 2011.

in-migration and out-migration CV increased, implying an increased concentration of both the origin of in-migration and the destination for out-migration in certain states; among the major states, Delhi falls under this quadrant. In the 2nd quadrant are the states whose CV of in-migration decreased and CV of out-migration increased. A total of 10 states are in this quadrant, including the southern states of Andhra Pradesh, Tamil Nadu, and Kerala and the western state of Goa. The 3rd quadrant shows seven states for which both in-migration and out-migration CV decreased. Among the major states, Haryana, Gujarat, Karnataka, and Bihar fall in this quadrant. The 4th quadrant includes states whose CV of in-migration increased and CV of out-migration decreased. Five states fall in this quadrant, including Maharashtra, Punjab, UP, and West Bengal.

The states falling under the 3rd and 4th quadrants do not have distinct regional characteristics. However, states with a high level of economic development and considerable in-migration, such as Maharashtra, Haryana, Gujarat, and Karnataka, share a common feature in that their CV of out-migration declined. The destinations for out-migration from these states indicate a tendency for decentralization over the period 1991–2011. However, the CV of in-migration increased only for Maharashtra while decreasing for the other three states. On the other hand, both UP and Bihar, which experienced significant out-migration to other states, saw a decrease in their CV of out-migration, although they are located in different quadrants. The destinations for out-migration from these two states reflect a tendency of dispersal.

According to the changes in the CV of the in-migration and out-migration volumes in each state, certain regional patterns can be identified. In the subsequent sections, I focus on the states with high CVs of in-migration and out-migration to capture specific inter-state migration changes and their impact on the overall migration pattern in India.

3. Characteristics of and changes in in-migration

This section focuses on states with a high CV of in-migration and examines specific changes in inter-state migration over the period 1991–2011. The states with a CV higher than the ACV in each year were included in the analysis.

Figure 4 shows the distribution of states where the CV of in-migration exceeds the ACV. According to the magnitude of the CV, the states were classified into three categories. The distribution in 1991 shows that states with a CV higher than the ACV were (1) Delhi, (2) western and southern states such as Goa, Karnataka, and Kerala, (3) eastern and northeastern states, and (4) the union territories[11] except Delhi. There were five states with a CV above 3.00, including West Bengal, Kerala, Goa, and Arunachal Pradesh. This was followed by six states with a CV above 2.50 but below 3.00, including Delhi and Bihar.

Turning to the distribution in 2011, it can be seen that the western and southern states were no longer extracted except for Goa. Goa also showed a decline in the CV of in-migration, falling into the class of states with CVs below 2.50 in 2011, whereas in 1991, it showed a CV above 3.00.

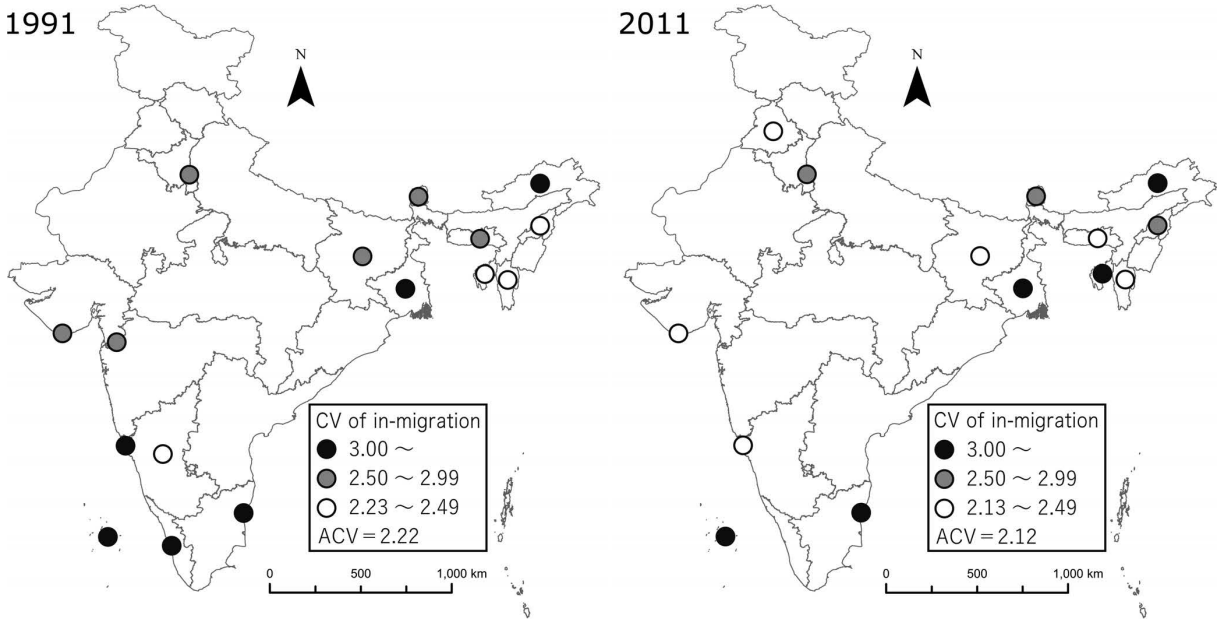

Figure 4. Distribution of states with CV of in-migration higher than the ACV
Source: Based on the Census of India 1991 and 2011.

These states tended to increasingly attract migrants from a wider geographical area, rather than from a particular state. Given that states with high economic development, such as Maharashtra and Gujarat, do not fall into the category of states with a high CV, it is suggested that the above-mentioned changes progressed in line with economic development. On the other hand, the CV of Delhi was above 2.50 even in 2011, which is noteworthy for its peculiarity. As for the northern and northeastern states, there was no change in the composition of the corresponding states, although there were some changes in the classes of CV values. West Bengal and Arunachal Pradesh maintained their CVs above 3.00. In particular, West Bengal, with the metropolitan area of Kolkata, remained strongly tied to a particular state, unlike Maharashtra, Gujarat, and Karnataka, which also have metropolitan areas.

Next, the composition of the origin of in-migration and the volume of in-migration to the states with high CVs were analyzed. Taking up the states extracted with a high CV in at least one year out of 1991 and 2011, the top three origin states of in-migration and the change in the volume of in-migration were examined for each state (Table 2). Based on this analysis, the discussion focused on (1) Delhi, (2) the southern states of Karnataka and Kerala and the western state of Goa, and (3) eastern and northeastern states, because the trends of CV in these states were distinctive.

The CV of in-migration in Delhi was above 2.50 in both 1991 and 2011, with a slight increase between 1991 and 2011. The ratio of migration from the top three origin states to total in-migration also increased from 70.6% in 1991 to 78.1% in 2011. There was no change in the composition and ranking of the origin states of in-migration, with the largest in-migration coming from UP, accounting for more than 45% of the total in-migration in both years. This was followed by Bihar and Haryana, but there was a change in their share of total in-migration between 1991 and 2011. Bihar's ratio increased significantly from 11.7% to 24.4%, while Haryana's ratio decreased from 11.7% to 7.9%, which may be reflected in the increase in Delhi's CV value.

The western state of Goa and the two southern states had a common feature in that the change in CV was confirmed. The ratio of migration from the top three origin states to total in-migration declined substantially from 84.5% to 68.4% in Goa, from 71.4% to 56.9% in Karnataka, and from 81.3% to 61.7% in Kerala. This led to a decline in the CV value, as mentioned earlier. If we look at the composition of the top three states in terms of the origin of in-migration in 1991, all three states were dominated by in-migration from western and southern states. Goa, with a CV above 3.00, was dominated by in-migration from Karnataka, whereas Kerala was dominated by in-migration from Tamil Nadu. The composition of the origin states of in-migration in 2011 was still dominated by southern and western states, but there was also an increase in the volume of in-migration from distant states, such as from UP to Goa and from West Bengal to Kerala. Thus, the majority of in-migration volume was from southern and western states in 1991, but there was a tendency to attract a broader population in 2011.

Finally, the changes in CV in the eastern and northeastern states were confirmed. With regard to the two eastern states, the composition of the top three origin states of in-migration was the same in both Bihar and West Bengal. Although the ratio of in-migration from UP to Bihar decreased from 26.1% to 22.6%, there was no significant change in the overall ratio of the top three states in terms of the origin of in-migration in either state. Thus, it can be seen that relations between certain states, such as Bihar and West Bengal, UP, and West Bengal and Bihar, remained intact. On the other hand, if we look at the northeastern states, the states with a high ratio of in-migration from Assam stand out. In 1991, five of the six states had the largest number of in-migrants from Assam. Only Sikkim was not strongly connected to Assam as it had the largest number of in-migrants from West Bengal. Even in 2011, there was no significant change in trends in these six states, with Assam and Bihar accounting for the majority of in-migrants. However, the number of in-migrants from Tripura exceeded that from Bihar in Mizoram, and the number coming from Bihar exceeded that from Assam in Tripura.

4. Characteristics of and changes in out-migration

Focusing on the states with high CVs with respect to out-migration, changes in inter-state migration during 1991–2011 were examined. As explained in the previous section, the states with a CV higher than ACV in each year were included in this analysis.

Figure 5 shows the distribution of states whose CV of out-migration exceeds the ACV. A large number of states with a high CV in 1991 were distributed in Southern to Western India, while there were several union territories with a high CV as well. In addition to these areas, Haryana, HP, Meghalaya, and Nagaland were categorized in the class of states with a CV higher than the ACV. Only the union territories of Daman and Diu and Puducherry had a CV above 3.00, and the three states of Gujarat,

Table 2. Composition of the top three origin states of in-migration for states with a high CV of in-migration

Destination	1991				2011			
	Origin		Migration volume	%	Origin		Migration volume	%
Arunachal Pradesh	1st	Assam	26,941	60.4	1st	Assam	27,546	66.4
CV of 1991: 3.29	2nd	Bihar	6,163	13.8	2nd	Bihar	4,769	11.5
CV of 2011: 3.58	3rd	Uttar Pradesh	3,350	7.5	3rd	West Bengal	2,057	5.0
		Total		81.7		Total		82.9
Bihar	1st	West Bengal	72,578	41.9	1st	West Bengal	117,516	41.0
CV of 1991: 2.58	2nd	Uttar Pradesh	45,223	26.1	2nd	Uttar Pradesh	64,652	22.6
CV of 2011: 2.47	3rd	Odisha	13,690	7.9	3rd	Odisha	27,900	9.7
		Total		75.9		Total		73.3
Goa	1st	Karnataka	30,138	52.4	1st	Karnataka	36,550	36.4
CV of 1991: 3.10	2nd	Maharashtra	15,508	27.0	2nd	Maharashtra	21,196	21.1
CV of 2011: 2.24	3rd	Kerala	2,948	5.1	3rd	Uttar Pradesh	10,969	10.9
		Total		84.5		Total		68.4
Karnataka	1st	Tamil Nadu	124,671	29.0	1st	Andhra Pradesh	243,770	24.7
CV of 1991: 2.22	2nd	Andhra Pradesh	105,981	24.7	2nd	Tamil Nadu	176,736	17.9
CV of 2011: 1.76	3rd	Maharashtra	76,165	17.7	3rd	Maharashtra	140,798	14.3
		Total		71.4		Total		56.9
Kerala	1st	Tamil Nadu	88,253	59.8	1st	Tamil Nadu	83,050	36.1
CV of 1991: 3.25	2nd	Karnataka	19,690	13.3	2nd	Karnataka	35,561	15.4
CV of 2011: 2.09	3rd	Maharashtra	12,070	8.2	3rd	West Bengal	23,353	10.1
		Total		81.3		Total		61.7
Punjab	1st	Uttar Pradesh	92,375	29.1	1st	Uttar Pradesh	207,685	33.4
CV of 1991: 1.97	2nd	Haryana	63,959	20.2	2nd	Bihar	118,550	19.1
CV of 2011: 2.14	3rd	Bihar	37,858	11.9	3rd	Haryana	94,065	15.1
		Total		61.2		Total		67.6
Meghalaya	1st	Assam	10,076	51.2	1st	Assam	13,278	45.1
CV of 1991: 2.76	2nd	Bihar	2,166	11.0	2nd	Bihar	2,988	10.2
CV of 2011: 2.46	3rd	West Bengal	1,522	7.7	3rd	Manipur	2,941	10.0
		Total		69.9		Total		65.2
Mizoram	1st	Assam	1,595	43.5	1st	Assam	4,684	35.7
CV of 1991: 2.44	2nd	Bihar	471	12.8	2nd	Tripura	3,312	25.2
CV of 2011: 2.44	3rd	Manipur	427	11.6	3rd	Manipur	2,461	18.8
		Total		67.9		Total		79.7
Nagaland	1st	Assam	6,487	43.9	1st	Assam	15,791	45.2
CV of 1991: 2.48	2nd	Bihar	2,287	15.5	2nd	Bihar	5,277	15.1
CV of 2011: 2.57	3rd	UP	1,413	9.6	3rd	Manipur	4,841	13.9
		Total		68.9		Total		74.2
Sikkim	1st	West Bengal	4,064	48.6	1st	West Bengal	11,618	50.7
CV of 1991: 2.75	2nd	Bihar	1,637	19.6	2nd	Bihar	4,733	20.6
CV of 2011: 2.87	3rd	Uttar Pradesh	718	8.6	3rd	Assam	1,334	5.8
		Total		76.8		Total		77.1
Tripura	1st	Assam	4,717	35.0	1st	Bihar	21,717	62.4
CV of 1991: 2.31	2nd	Bihar	3,412	25.3	2nd	Assam	7,113	20.4
CV of 2011: 3.47	3rd	West Bengal	1,879	13.9	3rd	Mizoram	1,436	4.1
		Total		74.2		Total		86.9
West Bengal	1st	Bihar	197,138	60.0	1st	Bihar	264,028	62.4
CV of 1991: 3.24	2nd	Uttar Pradesh	37,600	11.4	2nd	Uttar Pradesh	39,397	9.3
CV of 2011: 3.35	3rd	Odisha	24,611	7.5	3rd	Odisha	26,487	6.3
		Total		78.9		Total		78.0

Continuation of Table 2

Destination	1991				2011			
	Origin		Migration volume	%	Origin		Migration volume	%
Dadra & Nagar Haveli	1st	Gujarat	3,803	39.5	1st	Uttar Pradesh	17,855	25.6
CV of 1991: 2.56	2nd	Maharashtra	2,533	26.3	2nd	Bihar	14,238	20.5
CV of 2011: 1.97	3rd	Uttar Pradesh	1,397	14.5	3rd	Maharashtra	10,915	15.7
		Total		80.3		Total		61.8
Daman & Diu	1st	Gujarat	3,690	44.8	1st	Bihar	20,592	29.8
CV of 1991: 2.72	2nd	Maharashtra	2,148	26.1	2nd	Uttar Pradesh	17,613	25.5
CV of 2011: 2.14	3rd	Uttar Pradesh	631	7.7	3rd	Gujarat	7,413	10.7
		Total		78.5		Total		66.0
Delhi	1st	Uttar Pradesh	397,583	47.2	1st	Uttar Pradesh	559,516	45.8
CV of 1991: 2.61	2nd	Bihar	98,549	11.7	2nd	Bihar	298,238	24.4
CV of 2011: 2.73	3rd	Haryana	98,465	11.7	3rd	Haryana	97,034	7.9
		Total		70.6		Total		78.1
Lakshadweep	1st	Kerala	1,853	62.3	1st	Kerala	2,937	68.0
CV of 1991: 3.43	2nd	Maharashtra	512	17.2	2nd	Maharashtra	464	10.8
CV of 2011: 3.67	3rd	Tamil Nadu	195	6.6	3rd	Tamil Nadu	305	7.1
		Total		86.1		Total		85.9
Puducherry	1st	Tamil Nadu	43,765	82.1	1st	Tamil Nadu	55,954	76.2
CV of 1991: 4.41	2nd	Andhra Pradesh	3,676	6.9	2nd	Andhra Pradesh	7,114	9.7
CV of 2011: 4.11	3rd	Kerala	3,325	6.2	3rd	Kerala	5,418	7.4
		Total		95.2		Total		93.3

Source: Based on the Census of India 1991 and 2011.

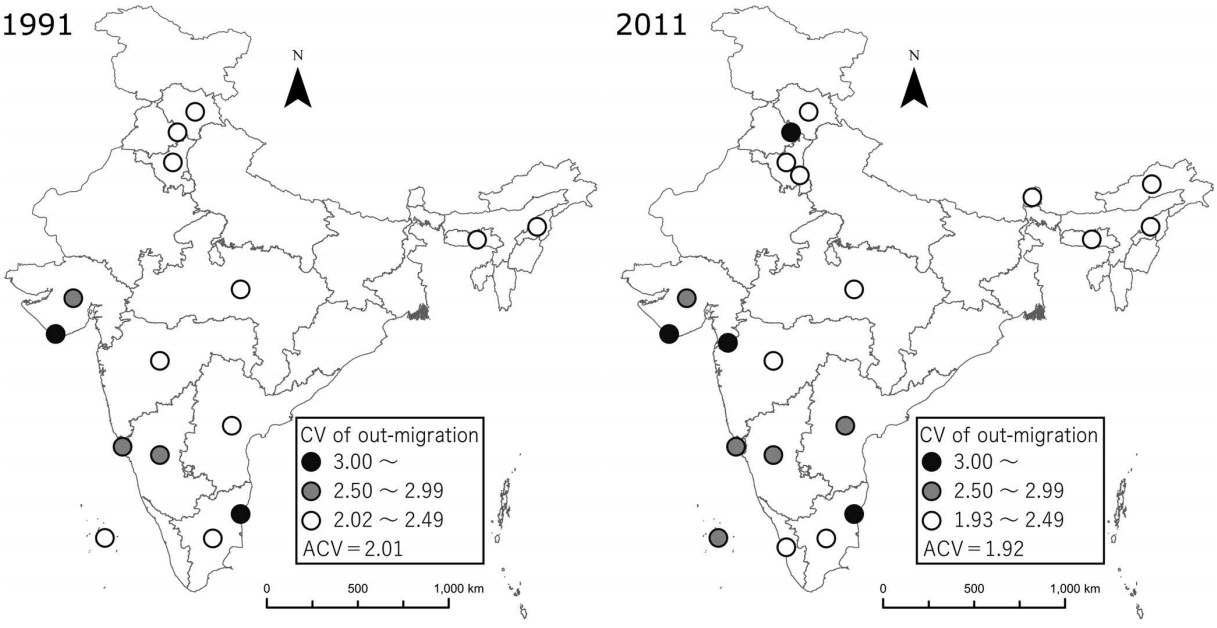

Figure 5. Distribution of states with CV of out-migration higher than the ACV
Source: Based on the Census of India 1991 and 2011.

Table 3. Composition of the top three destination states of out-migration for states with a high CV of out-migration

Origin	1991				2011			
	Destination		Migration volume	%	Destination		Migration volume	%
Andhra Pradesh	1st	Karnataka	105,981	34.9	1st	Karnataka	243,770	44.3
CV of 1991: 2.24	2nd	Maharashtra	71,286	23.5	2nd	Maharashtra	107,804	19.6
CV of 2011: 2.60	3rd	Tamil Nadu	35,033	11.5	3rd	Tamil Nadu	75,988	13.8
		Total		69.9		Total		77.7
Arunachal Pradesh	1st	Assam	3,870	31.3	1st	Assam	6,280	42.9
CV of 1991: 1.77	2nd	Andhra Pradesh	1,340	10.8	2nd	Karnataka	1,102	7.5
CV of 2011: 2.28	3rd	Bihar	1,040	8.4	3rd	Uttar Pradesh	974	6.7
		Total		50.5		Total		57.1
Goa	1st	Maharashtra	8,170	45.1	1st	Maharashtra	12,880	46.4
CV of 1991: 2.58	2nd	Karnataka	3,750	20.7	2nd	Karnataka	7,465	26.9
CV of 2011: 2.80	3rd	Bihar	880	4.9	3rd	Andhra Pradesh	1,285	4.6
		Total		70.6		Total		77.9
Gujarat	1st	Maharashtra	140,749	52.4	1st	Maharashtra	170,480	48.4
CV of 1991: 2.88	2nd	Rajasthan	39,610	15.5	2nd	Rajasthan	51,061	14.5
CV of 2011: 2.66	3rd	Madhya Pradesh	16,037	8.6	3rd	Madhya Pradesh	26,667	7.6
		Total		76.5		Total		70.4
Haryana	1st	Delhi	98,465	30.8	1st	Rajasthan	101,372	23.0
CV of 1991: 2.24	2nd	Rajasthan	73,156	22.9	2nd	Delhi	97,034	22.0
CV of 2011: 2.03	3rd	Punjab	63,959	20.0	3rd	Punjab	94,065	21.4
		Total		73.7		Total		66.4
Himachal Pradesh	1st	Punjab	29,400	33.9	1st	Punjab	36,669	34.0
CV of 1991: 2.07	2nd	Delhi	12,761	14.7	2nd	Chandigarh	15,319	14.2
CV of 2011: 2.09	3rd	Chandigarh	11,257	13.0	3rd	Haryana	14,067	13.0
		Total		61.6		Total		61.2
Karnataka	1st	Maharashtra	183,910	51.7	1st	Maharashtra	302,731	50.9
CV of 1991: 2.91	2nd	Andhra Pradesh	63,103	17.7	2nd	Andhra Pradesh	90,045	15.2
CV of 2011: 2.87	3rd	Goa	30,138	8.5	3rd	Tamil Nadu	77,607	13.1
		Total		78.0		Total		79.2
Kerala	1st	Tamil Nadu	71,417	25.5	1st	Tamil Nadu	109,711	32.5
CV of 1991: 1.90	2nd	Karnataka	59,686	21.3	2nd	Karnataka	105,230	31.2
CV of 2011: 2.40	3rd	Maharashtra	48,740	17.4	3rd	Maharashtra	44,120	13.1
		Total		64.2		Total		76.8
Madhya Pradesh	1st	Maharashtra	104,899	28.8	1st	Maharashtra	279,542	32.3
CV of 1991: 2.06	2nd	Uttar Pradesh	79,683	21.9	2nd	Uttar Pradesh	145,711	16.9
CV of 2011: 2.08	3rd	Rajasthan	63,386	17.4	3rd	Rajasthan	129,718	15.0
		Total		68.1		Total		64.2
Maharashtra	1st	Gujarat	150,435	30.9	1st	Gujarat	237,187	30.4
CV of 1991: 2.10	2nd	Madhya Pradesh	105,815	21.8	2nd	Karnataka	140,798	18.1
CV of 2011: 1.96	3rd	Karnataka	76,165	15.7	3rd	Madhya Pradesh	119,927	15.4
		Total		68.4		Total		63.9
Meghalaya	1st	Assam	6,170	44.5	1st	Assam	8,337	44.4
CV of 1991: 2.36	2nd	West Bengal	1,080	7.8	2nd	West Bengal	1,454	7.7
CV of 2011: 2.36	3rd	Delhi	680	4.9	3rd	Karnataka	1,169	6.2
		Total		57.1		Total		58.3
Nagaland	1st	Assam	3,200	38.2	1st	Assam	6,517	42.2
CV of 1991: 2.02	2nd	Maharashtra	590	7.0	2nd	West Bengal	1,073	6.9
CV of 2011: 2.23	3rd	Uttar Pradesh	510	6.1	3rd	Delhi	877	5.7
		Total		51.3		Total		54.8

Continuation of Table 3

Origin	1991				2011			
	Destination		Migration volume	%	Destination		Migration volume	%
Sikkim	1st	Uttar Pradesh	1,210	16.8	1st	West Bengal	3,334	46.1
CV of 1991: 1.45	2nd	Andhra Pradesh	1,190	16.5	2nd	Karnataka	571	7.9
CV of 2011: 2.47	3rd	West Bengal	1,130	15.7	3rd	Himachal Pradesh	493	6.8
		Total		49.0		Total		60.8
Tamil Nadu	1st	Karnataka	124,671	29.4	1st	Karnataka	176,736	37.4
CV of 1991: 2.06	2nd	Kerala	88,253	20.8	2nd	Kerala	83,050	17.6
CV of 2011: 2.30	3rd	Andhra Pradesh	63,990	15.1	3rd	Puducherry	55,954	11.8
		Total		65.3		Total		66.8
Chandigarh	1st	Haryana	16,650	33.1	1st	Punjab	44,378	56.3
CV of 1991: 2.45	2nd	Punjab	16,378	32.6	2nd	Haryana	17,089	21.7
CV of 2011: 3.18	3rd	Uttar Pradesh	4,120	8.2	3rd	Himachal Pradesh	4,557	5.8
		Total		73.9		Total		83.8
Dadra & Nagar Haveli	1st	Gujarat	887	26.1	1st	Gujarat	2,685	63.2
CV of 1991: 1.94	2nd	Uttar Pradesh	830	24.4	2nd	Maharashtra	761	17.9
CV of 2011: 3.47	3rd	West Bengal	470	13.8	3rd	Lakshadweep	114	2.7
		Total		64.2		Total		83.7
Daman & Diu	1st	Gujarat	1,760	58.2	1st	Gujarat	3,024	64.2
CV of 1991: 3.10	2nd	Uttar Pradesh	240	7.9	2nd	Maharashtra	606	12.9
CV of 2011: 3.49	3rd	Maharashtra	140	4.6	3rd	Dadra & Nagar Haveli	460	9.8
		Total		70.7		Total		86.8
Delhi	1st	Uttar Pradesh	47,367	26.7	1st	Uttar Pradesh	181,693	38.0
CV of 1991: 1.86	2nd	Haryana	40,261	22.7	2nd	Haryana	125,581	26.3
CV of 2011: 2.40	3rd	Rajasthan	15,467	8.7	3rd	Maharashtra	29,703	6.2
		Total		58.1		Total		70.5
Lakshadweep	1st	Tamil Nadu	620	28.0	1st	Kerala	1,196	47.8
CV of 1991: 2.16	2nd	Uttar Pradesh	580	26.2	2nd	Bihar	248	9.9
CV of 2011: 2.59	3rd	Kerala	400	18.1	3rd	Uttar Pradesh	230	9.2
		Total		72.3		Total		67.0
Puducherry	1st	Tamil Nadu	15,700	72.4	1st	Tamil Nadu	55,226	86.5
CV of 1991: 3.93	2nd	Kerala	3,220	14.8	2nd	Kerala	4,456	7.0
CV of 2011: 4.65	3rd	Andhra Pradesh	940	4.3	3rd	Andhra Pradesh	1,756	2.8
		Total		91.5		Total		96.2

Source: Based on the Census of India 1991 and 2011.

Karnataka, and Goa had a CV above 2.50. Except for MP, all the states in the Hindi belt had a CV below the ACV value, which is a notable feature of the distribution. This suggests that out-migration from these states was not limited to a particular state, but was widespread.

The fundamental characteristics of the distribution observed in 1991 did not change substantially in 2011. There were four union territories with a CV above 3.00, with the addition of Chandigarh and Dadra and Nagar Haveli to the list. The number of states with a CV above 2.50 also increased to five, with Andhra Pradesh and the union territory of Lakshadweep joining the list. Delhi, Kerala, Arunachal Pradesh, and Sikkim were also extracted as states with CVs higher than the ACV in 2011.

Based on this data, the composition of the specific destinations for out-migration and the volume were analyzed. The states extracted as the states with a CV higher than ACV in at least one year out of 1991 and 2011 were taken up, and the composition of the top three destination states in terms of the volume of out-migration and changes in their numbers were examined (Table 3). In this section, states are classified into (1) northern, (2) southern and western, and (3) northeastern states, and trends in each state are clarified.

The ratio of the top three destinations of out-migration from Delhi increased from 58.1% in 1991 to 70.5% in 2011. The top two states with the highest rate of out-migration were UP and Haryana, which did not change during this period, but increased in value. It can be said that between 1991 and 2011, the relationship between

these two states strengthened further, and Delhi's CV also surpassed the ACV in 2011. These trends may reflect the development of suburban areas in the NCR.

As for Haryana and HP, the top three destination states in terms of the volume of out-migration in 1991 were all in the north. Of these, Delhi and Punjab were common to both states. The ratio of out-migration to Delhi declined significantly in 2011 for both Haryana and HP, indicating that Delhi's ability to attract migrants from these two states had declined.

When we look at the southern and western states, the destinations with the largest volume of out-migration in each state in 1991 were confined to Maharashtra, Gujarat, Tamil Nadu, and Karnataka, with the pattern of migration centered in these four states. In particular, out-migration from Gujarat and Karnataka to Maharashtra, from Daman and Diu to Gujarat, and from Puducherry to Tamil Nadu accounted for more than half of the total out-migration volume in each state, indicating a strong regional relationship. In addition, looking at the composition of the top two and three destinations of out-migration in each state, southern and western states accounted for almost all out-migration, indicating that migration was mainly between neighboring states.

The out-migration pattern of 1991 was fundamentally unchanged in 2011. For Lakshadweep, the top destination shifted from Tamil Nadu to Kerala, but there was no change in the other states. As for the top two and three states in terms of the volume of out-migration, there were some changes in the composition of the destinations for out-migration, but the migration patterns between neighboring states were maintained.

Finally, changes in the northeastern states were examined. If we look at the composition of the destinations of out-migration in 1991, the three states of Meghalaya, Nagaland, and Arunachal Pradesh had in common the predominance of out-migration to Assam. On the other hand, Sikkim's out-migration to a particular state was less concentrated and its CV was also lower than the ACV. The top three destinations of out-migration from Sikkim were UP, Andhra Pradesh, and West Bengal. In addition to UP and West Bengal, which are relatively close to each other, AP in South India was also included.

The composition in 2011 shows that the three states of Meghalaya, Nagaland, and Arunachal Pradesh continued to have strong ties with Assam. This result suggests that Assam has a certain level of population attraction in Northeastern India. These characteristics of Assam were also confirmed in the analysis by Chen and Katsumata (2019). In the case of Sikkim, the ratio of out-migration to West Bengal increased significantly, accounting for nearly half of the total volume, indicating a change in the migration pattern of this state.

V. Conclusion

This paper attempts to clarify the characteristics of and changes in patterns of inter-state migration in India after economic liberalization using CV analysis.

In 1991, inter-state migration accounted for only 14.4% of total internal migration in India. However, inter-state migration increased from the 1991 level to account for 16.8% of internal migration by 2011. Thus, it is confirmed that the importance of inter-state migration increased due to economic development and widening regional disparities after the economic liberalization. The CV analysis confirmed the change in patterns of inter-state migration as it found that both in-migration and out-migration showed a trend toward decentralization.

In terms of the CV of in-migration, the states with a CV higher than ACV in 1991 were as follows: (1) Delhi, (2) western and southern states such as Goa, Karnataka, and Kerala, (3) eastern and northeastern states, and (4) union territories except Delhi. In these states, in-migration from a particular state was dominant. Barring a few states, western and southern states were not extracted in 2011. This implies that the tendency to attract migrants from a wider range of states, rather than one particular state, has increased with economic development. On the other hand, for Delhi and the eastern and northeastern states, the CV of in-migration remained high and ties with specific states remained strong. Specifically, Delhi had a high ratio of in-migration from UP and Bihar. In the eastern states, migration was predominantly from neighboring states, as evident in the migration from West Bengal and UP to Bihar and from Bihar to West Bengal. In-migration from Assam and Bihar was conspicuous in the northeastern states.

On the other hand, a large number of states with high CVs of out-migration in 1991 were distributed in the southern and western parts of India, and many of the union territories also fell in this category. Out-migration from southern and western states mainly occurred to the neighboring states, especially Maharashtra, Gujarat, Tamil Nadu, and Karnataka. On the other hand, except for MP, the CVs of all the states in the Hindi belt were lower than the ACV values. This indicates that out-migration from these states is not limited to a particular state, but is widespread. Haryana, HP, Meghalaya, and Nagaland also showed relatively high CV values. The fundamental

distributional characteristics observed in 1991 did not change in 2011. However, it is important to note that Delhi had a CV higher than the ACV. In this state, out-migration to UP and Haryana accounted for most of the total out-migration volume, and the relationship with these two states became stronger during 1991–2011, which is reflected in the CV values. This trend may reflect the suburban development of the NCR. In addition, in Haryana and HP, the ratio of out-migration to Delhi declined significantly, indicating that Delhi lost its ability to attract migrant population from both states. The results for Northeast India suggest that Assam tends to attract migrant population.

Based on the results of the analysis, it can be understood that the fundamental patterns of inter-state migration in 1991 were maintained even in 2011. On the other hand, when the trends of each state were examined in detail, it was found that the western and southern states, which showed changes in in-migration patterns, and Delhi, which showed changes in out-migration patterns, exhibited characteristic trends. In the future, a more detailed analysis at the state level will be required, focusing on this trend. It is also necessary to analyze the factors behind these changes in migration patterns.

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Notes

1. When the NSDP values of the north and south are compared, they are higher in Southern India than in Northern India, except for Delhi and its neighboring states. When the east and west are compared, many states with high values are distributed in the western part.
2. The Hindi belt is the Hindi-speaking region of Northern India, where low income and problems related to poverty are prevalent. It also has common features such as a high population growth rate and low levels of social welfare (Sato, 1994).
3. The Employment and Unemployment Situation in India, which was conducted in the National Sample Survey 64th Round (July 2007–June 2008), provides data on migration (Shimane, 2020).
4. For example, Index of migration efficiency, Hoover index, and Gini coefficient (Rogers and Sweeney, 1998; He and Pooler, 2002). Rogers and Sweeney (1998) conducted a comparative evaluation of CV and Gini coefficient using data on inter-state migration in the United States.
5. https://censusindia.gov.in/DigitalLibrary/Archive_home.aspx (accessed January 27, 2021)
6. Since the 1971 census, data on migration has been disaggregated based on place of last residence and place of current residence (Bhagat and Mohanty, 2009; Bhagat and Keshri, 2020).
7. This is the place of current residence at the time of the census survey.
8. The name was changed to Uttarakhand in 2006.
9. Based on the population data of the Urban Agglomeration set in census; this is often used to describe the population size of a metropolitan area (Hino and Une, 2015).
10. In 2011, the population of UP was 199,812,341, the largest among states, accounting for 16.5% of the total population in India.
11. The Andaman and Nicobar Islands, Chandigarh, Dadra and Nagar Haveli, Daman and Diu, Lakshadweep, Delhi, and Puducherry are the union territories.

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