On the Importance of Triangulating Data Sets to Examine Indians on the Move

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A chapter dedicated to migration in the *Economic Survey 2016–17* signals the willingness on the part of Indian policymakers to address the linkages between migration, labour markets, and economic development. This paper attempts to take forward this discussion. We comment on the salient mobility trends in India gleaned from existing data sets, and then compare and critique estimates of the *Economic Survey* with traditional data sets. After highlighting the data and resultant knowledge gaps, the article comments on the possibility of using innovative data sources and methods to understand migration and human mobility. It also offers ideas on how an enhanced understanding of mobility is important for policy interventions for those individuals who change locations permanently and those who move seasonally.

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It would not be an exaggeration to say that migration statistics has not been anyone's priority in India. The National Sample Survey Office's (NSSO) survey of employment–unemployment and migration was last conducted in 2007–08. Subsequent surveys of NSSO, at best, have had a question or two on a specific aspect of migration, which are certainly not enough to piece together any compelling evidence on migration flows. Based on information collected as part of the Census of India 2011, the Office of the Registrar General and Census Commissioner, India (RGI) has released exactly one state-specific table on internal migration in India. The year is 2017 and we know precious little about migration patterns between 2001 and 2011, leave alone what is happening in real time. As a result, in the era of "smart" and "digital," programmes and policies related to migration are being conceived sans robust and timely data.

The *Economic Survey 2016–17* (GOI 2017a) highlights this data paucity while also opening up the possibilities of using innovative sources and methods for estimating human mobility in the country. The *Economic Survey* provides indirect estimates of internal migration based on change in population of age-cohorts over 2001–11 and an additional estimate based on un-reserved ticket sales data from the Indian Railways. The two estimates differ widely from those of traditional data sets. The *Economic Survey* builds the case that on an average nine million individuals annually changed residence permanently on account of work since 2011–12. Contrast this with the following estimates. As per the Census of India, in the period 1981–90, 1991–2000, and 2001–10, an estimated 9.9 million, 14.5 million, and 18.7 million individuals, respectively, moved on account of work. It is evident that the estimate based on railway data is higher by a multiple of 4.5 times. These sizeable differences raise the issue of comparability of these data sets, but also points to the urgent need to examine closely if human mobility has indeed increased substantially in recent times.

The *Economic Survey* does not go as far as to leverage these migration estimates to make policy suggestions. Nevertheless, the dedication of a whole chapter to migration combined with the release of the *Report of the Working Group on Migration* (GOI 2017b), an inter-ministerial committee set up by the Ministry of Housing and Urban Poverty Alleviation, Government of India (GOI), signal a willingness on the part of Indian policymakers to confront, perhaps for the first time explicitly, the linkages between migration, labour markets, and economic development. This paper attempts to take forward this spirit, seeking

to (i) comment on the salient mobility trends in India gleaned from existing data sets; (ii) compare and critique estimates of the *Economic Survey* with traditional data sets; (iii) offer a preliminary exploration of the use of innovative data sources and methods to understand migration and human mobility; and (iv) offer ideas on how an enhanced understanding of mobility could inform policy in the Indian context.

Salient Mobility Trends

At the outset, it is important to highlight that the criterion used to identify a migrant differs across the Census of India and NSSO data sets (GOI 2017b). Hence, we avoid direct comparisons of estimates based on the Census of India and NSSO surveys and instead compare the trends evident from these two data sources. Data from NSSO's survey exhibited a marginal increase in the share of migrants in rural and urban population. The Census of India, however, does record a significant increase in the share of migrants in rural and urban India by 4.2 percentage points and 12 percentage points respectively between 2001 and 2011 (Table 1). As per the census, the total number of migrants residing in rural and urban India has increased steadily over the successive decades (Table 2). There are differences in the share of migrants in rural and urban population not only across states but also over the last three censuses. Among the major states, between 1991 and 2001, the share of migrants in Maharashtra's total population increased substantially while in the period 2001–11, it is only in Kerala and Tamil Nadu that we see a substantial increase in the proportion of migrants living in both rural and urban areas over the period 2001–11 (Appendix Table A1, p 68).

The top seven states, namely Maharashtra, Andhra Pradesh (AP), West Bengal, Uttar Pradesh (UP), Gujarat, Tamil Nadu, and Karnataka accounted for 62.8% of the total male migrant population of India in 2001. The share of these states in the total male migrant population in India remains nearly unchanged at 63%. Barring UP, the other six states are relatively the more urbanised among major Indian states. The two factors that act as magnets for migrants and migrant workers from out of state are: these states have a diversified economic base, and they offer more employment opportunities.

In the case of share of female migrants, the top five states in order of their share in 2001 and 2011 were unchanged. These states were UP, Maharashtra, Bihar, West Bengal, and AP. The share of these states in 2001 and 2011 was 49.8% and 48.2%, respectively. Women move primarily on account of marriage, and it is not an unreasonable conjecture that most women are also likely to marry within the same state. These five states

accounted for 48.6% of India's total population in both 2001 and 2011. This is reflected in the share of these five states in terms of total female migrants.

Component of urban population growth: The increase in urban population is typically decomposed into the following three components: natural increase in urban areas, reclassification of rural areas as urban, and net migration from rural to urban areas. In the popular imagination, rural–urban migration has been imagined as the prime cause for the growth of cities and blamed for associated problems like congestion and an increase in slums. However, the relative importance of reclassification and net rural–urban migration is context specific and varies across countries and also within India. Before the release of migration tables, Pradhan (2013) estimated that reclassification of rural areas as urban (new census town) accounted for nearly 30% of the urban growth in the period 2001–11, while 22.2% of urban population growth was on account of migration.

Following the release of the Census of India tables on migration we now know that in absolute terms, all-India, the number of net rural–urban migrants increased by 1.43 times from 14.46 million in the intercensal period 1991–2001 to 20.7 million in the period 2001–11. In the period 1991–2001, net rural–urban migration accounted for 20.6% of India's population growth and in the period 2001–11 it had marginally increased to 22.8% (Table 3). Therefore, contrary to expectations, even in 2001–11 rural–urban migration is not the primary driver of urban growth in India. Among the major states, in contrast to Bihar, West Bengal, Odisha, AP, and Kerala, the contribution of rural–urban migration to growth in urban population was higher in 2011 as compared to 2001 in the following states: Haryana, Delhi, UP, Assam, Jharkhand, Maharashtra, and Tamil Nadu (Table 3).

The 12-percentage point increase over the period 2001–11 in the share of migrants in urban population begs an explanation

Table 1: Comparison of Estimates of Share of Migrants in Rural & Urban Population (%)

	Rural India	Urban India
1991 Census of India	26.1	32.3
2001 Census of India	28.3	36.4
2011 Census of India	32.5	48.4
NSSO's 1999–2000 survey*	24.4	33.4
NSSO's 2007–08 survey*	26.1	35.4

Source: Census of India Migration Tables; * GoI (2010).

Table 2: Number of Migrants Residing in Rural and Urban India (million)

	1991	2001	2011
Rural	162.5	210.4	271.1
Urban	69.6	104.2	182.6

Source: Census of India Migration Tables.

Table 3: Contribution of Net Rural–Urban Migration to Growth in Urban Population (%)

State	1991–2001	2001–11	State	1991–2001	2001–11
Jammu and Kashmir	12.32	13.13	West Bengal	17.55	13.71
Himachal Pradesh	37.29	31.68	Jharkhand	24.45	28.12
Punjab	21.31	19.88	Odisha	35.45	32.78
Chandigarh	46.21	63.15	Chhattisgarh	25.51	25.09
Uttarakhand	28.07	26.06	Madhya Pradesh	23.22	23.29
Haryana	26.39	30.78	Gujarat	35.12	35.7
Delhi	29.74	42.7	Daman & Diu	-26.43	61.67
Rajasthan	15.95	18.41	Dadra & Nagar Haveli	20.51	51.4
Uttar Pradesh	11.64	18.47	Maharashtra	29.77	35.52
Bihar	18.61	13.25	Andhra Pradesh	25.13	19.62
Sikkim	-8.83	11.83	Karnataka	20.49	20.89
Arunachal Pradesh	27.24	39.77	Goa	8.53	21.04
Nagaland	9.53	5.7	Lakshadweep	57.24	1.58
Manipur	7.44	7.09	Kerala	17.85	11.87
Mizoram	28.04	32.91	Tamil Nadu	5.46	14.01
Tripura	25.42	16.52	Pondicherry	12.85	5.8
Meghalaya	8.84	15.25	Andaman and Nicobar Islands	12.54	49.41
Assam	19.13	26.99	India	20.56	22.75

Source: Census of India Migration Tables.

(Table 1). Towards this, we decompose the share of migrants in urban India into the following components: rural–urban migrants, urban–urban migrants, and urban migrants from unclassified location (that is, their origin could be either rural or urban) residing in urban India. We find that the share of each component was 18.5%, 13.1%, and 4.8% respectively in 2001 (note that these three figures add up to 36.4%). Correspondingly in 2011, it was 21.9%, 21%, and 5.5% respectively (note that these three figures add up to 48.4%). Thus, the sharp increase in the share of urban–urban migrants residing in urban India contributed to the increase in migrants in the urban population in 2011 as compared to 2001.

Migration streams: We next focus on the changes in the share of migration streams,[1] namely, rural–rural, rural–urban, urban–rural, and urban–urban (Table 4). The importance of the rural–rural migration stream has declined both in case of men and women, not an uncommon feature during the process of economic growth and development. The share of the rural–urban migration stream has marginally increased. The real growth is in urban–urban movements. In the case of male (female) migrants, the share of urban–urban migration has gone up from 19% (9.1%) in 1991 to 28.8% (15.1%) in 2011. The RGI would need to release additional tables in order to make clear the nature of urban–urban movement. Is this movement intra-state or interstate? What is the distribution of urban–urban migrants across size class of cities? The latter question which is critical in our view has never been addressed since the RGI does not release the data at a disaggregated level.

Table 4: Distribution of Male and Female Migrants by Streams

	1991			2001			2011		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Rural–rural	43.5	72.3	64.5	36.6	72.1	62.7	33.9	64.0	54.9
Urban–rural	7.5	5.4	6.0	6.3	4.2	4.7	7.1	5.2	5.8
Rural–urban	30.0	13.2	17.7	34.2	13.7	19.1	30.2	15.7	20.1
Urban–urban	19.0	9.1	11.7	22.9	10.0	13.5	28.8	15.1	19.3
Total	100	100	100	100	100	100	100	100	100

Source: Census of India Migration Tables.

Very little attention is also typically paid to the urban–rural migration stream. The share of urban–rural migration stream increased by 1.6 percentage points from 4.7% in 2001 to 5.8% in 2011. The increase is evident for both men and women. It is pertinent to note that the NSSO's survey conducted in 2007–08 estimated the share of the urban–rural stream in total migration to be at 5.7%. Is urban to rural migration a case of return migration by the household? To further examine this issue we focus on the reasons for migration, by migration stream. Here, an interesting aspect emerges. The proportion of men and women who report moving for work or employment has declined, while there has been a corresponding increase in the share of men and women who move with the household. Given that urban–rural migration has increased for both men and women, taken together, the patterns could indicate the prevalence of return migration. While there is a large literature on return migration among international migrants, the literature on return migrants in the context of internal migration is sparse.

Similar to China, return migration in India may also be driven by older migrants who move back to the village after their active work life is over. If it is the elderly who constitute a large share of return migrants, then India will need to face head on the healthcare and care demands of these returnees. While detailed data from Census 2011 is not available at present, 27.4% of urban–rural migrants in 2001 were above the ages of 40 years. While some literature looking at international migrants highlights that return migrants have financial savings, enabling self-employment upon return, a diametrically opposite reason is also plausible. Migrants might return from urban to rural areas because cities are exclusionary (Kundu and Saraswati 2012) and housing in urban areas expensive and crowded. The unavailability of secure regular salaried jobs that match their, usually low, skill levels might have induced urban migrants to return. These conjectures need to be interrogated using data from NSSO's survey on employment, unemployment, and migration, whenever it is next conducted.

Marriage migration and beyond: In order to highlight the fact that women who migrate for reasons related to marriage typically report working, we focus specifically on the issue of marriage migration. Among those who migrate, a large proportion is women and a majority of them (as per Census 2011, 70%) report moving due to marriage in sharp contrast to a mere 4.3% of women migrants reporting that they moved due to employment-related reasons. Estimates from the NSSO's 2007–08 survey are also in the low single digits. Based on this survey, we also estimate that in rural India, nearly 93.5% of women aged 15–59 years reported having moved for reasons related to marriage. In urban India, 65% of women reported moving for reasons related to marriage and another 26% moved with the parent or earning member of the family. What is missed in the discourse is that women who move due to marriage also work. Among all the female migrants who stated their main reason for migration as marriage or movement with earning member, nearly 35% of rural and 14% of urban women are found to be currently part of the active workforce. The proportions do not change if we only focus on women who moved for reasons related to marriage. A simplistic reading of the data would therefore tell the story of women purely as associational migrants, but a deeper analysis tells a different story of migrant women as workers. This underscores the need for detailed labour market histories of individuals that reconcile with migration experiences.

Migration for education: Migration for education, a relatively under researched yet important area, can be traced to the uneven distribution of institutes of higher learning across the Indian states. It is reasonable to assume that individuals who moved for education are doing so to pursue higher education. With the meagre information that is available from Census 2011, what we can work out is the share of each state among those individuals who reported that they moved for reasons pertaining to education. Instead of focusing on only the

intercensal period we focus on the total stock of migrants in 2001 and 2011. In 2001, the following three states accounted for a large share of those who moved either within the state or from another state for reasons pertaining to education: Maharashtra (18%), AP (12.5%), and Karnataka (10.2%). Thus, these three states accounted for 40.7% of individuals of in-migrants for the purpose of education. In 2011 too, Maharashtra (15.6%), AP (15.1%) and Karnataka (9%) continued to attract individuals who wanted to pursue education. The share of Tamil Nadu in total in-migrants for education increased from 6.2% in 2001 to 9.7% in 2011. These four states thus accounted for nearly half the stock of in-migrants for education.

We believe that the issue of reservation by domicile status in institutes of higher learning is likely to become a contested issue in the Indian courts in the coming decades. Domicile restrictions imposed by state governments on college and university admissions have already been challenged and quashed in court. Notably, the Supreme Court in *Pradeep Jain v Union of India* (Civil Appeal 6392 of 1983) held that in case of admission to higher educational institutions, classifying candidates based on their place of residence would be in violation of equality guaranteed by Article 14. A Constitution Bench of the Supreme Court affirmed this in 2004 in *Saurabh Chaudhri v Union of India* (Civil Writ Petition No 29/2003). Detailed data on education-related migration is needed to enrich this conversation and support higher education policy.

Key takeaways: The key takeaways from the above discussion are the following. First, the geographies of migration have remained stable in India. Second, in South Asia, including India, it is natural increase and reclassification of rural areas as urban and not net rural–urban migration that drives urban population growth. Third, there was a sharp increase in the share of migrants in the urban population. Consistent with this increase, we find that among the four migration streams, the share of urban–urban flow has increased for both men and women. Data limitations do not allow us to explore factors that are driving urban–urban flows. The large urban–urban flows call for a shift in migration policy whose primary focus has been on rural–urban migration. Fourth, women could report that they moved on account of marriage but could be presently working. Fifth, the share of individuals migrating for education has risen in the period 2001–11. Since it is possible that individuals move for higher education and then to another location for work, it is also important to have information on migration histories.

Before concluding this section it would be pertinent to highlight the following recommendations of the Working Group on Migration to address the data gaps. The group recommended prioritisation of release of migration tables from the census ensuring that migration data is available no later than a year after the primary census abstract, and release of district-to-district migration flows classified by reason for migration. In case of NSSO's surveys the group recommended that questions relating to migration be included in the periodic labour force survey.

Insights from *Economic Survey 2016–17*

The *Economic Survey* starts off on the premise that the Census of India underestimates the extent of migration, though there is little by way of explanation for this assertion. The survey uses two approaches to arrive at estimates of internal migration. Since these estimates are higher than those reported either by the Census of India or the NSSO, the *Economic Survey* goes on to pose the following puzzle. If a large number of Indians are indeed on the move within the country, then why does one not see convergence of incomes and consumption at the subnational level? One plausible reason could be that what the *Economic Survey*'s measure captures is mobility and not necessarily migration related to work. While its approach does a fair job of identifying high in-migration and outmigration districts, its estimates are open to question.

Age cohort method: The first approach used by the authors of the survey is what they call the cohort-based migration metric (CMM). The method is best understood by the following example. Suppose there are 100 people in the age group 10–19 years in a particular district in 2001. Assuming that no one dies and there is no in-migration or outmigration, the population of individuals in the age group 20–29 years in 2011 should be 100 in that district. Now suppose if we have a reasonable estimate of the mortality rate for this age group, we can then work out the projected population of those aged 20–29 years in this district for 2011. The difference between the actual and projected population for 2011 for this age group provides an estimate of migration for this age group. If the difference is positive (negative) then the district was witness to net in (out) migration for this age group. In order to arrive at an estimate for the whole population the authors multiply the estimate for the age group 20–29 years by a factor of five. The logic offered for this is that "as per Census 2001, the 20–29 age cohort formed a fifth of all migrants" (GOI 2017a: 201). The projected population for all age groups together in 2011 is now compared with the actual population as reported in 2011 for a district or a state. They estimated the out of state net migration between 2001 and 2011 to be at least 55 million.[2] The way this measure has been constructed it does not include intra-state migrants. And when they redo the exercise at the district level, they estimate out of district net migration to be at least 80 million. This estimate misses out on the intra-district migrants. By construction the estimate of state net migration is a component of estimate of out of district net migration. The *Economic Survey* presents the list of high out-migration and high in-migration districts. These appear consistent with what one would a priori expect.

Sale of unreserved tickets: The authors of the *Economic Survey* show ingenuity by creatively using data on the sale of unreserved tickets which was made available to them by the Indian Railways. The authors aggregated the pairwise sale of

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unreserved tickets between two stations that are at least 200 kilometres apart to arrive at district-to-district sale of unreserved tickets. They calculate annual net sale of tickets between two district pairs and this is advanced by the authors as a proxy for annual work-related migrant flow between district pairs. Based on this methodology, the *Economic Survey* estimates that on an average 9 million individuals annually changed residence permanently on account of work since 2011–12. There is no disputing the fact that pair-wise district estimates reflect mobility corridors which in turn should be inputs for planning future transport investments. The fact that the district-wise patterns correlate well with associated factors or that the ranking of districts are consistent with other indicators cannot provide the basis for the assumption that these are estimates of work-related migration flows. One apparent problem with the estimate is their finding that the Delhi region absorbs more than half the 9 million migrants. This is a red flag since it is unlikely that the National Capital Region of Delhi can absorb nearly 4.5 million individuals annually. The reservations about the estimates should not take the shine away from the exercise that has been attempted. Setting aside the issue of estimates for a moment, what needs to be appreciated is that the *Economic Survey* has persuasively shown that the railway data can be used to identify migration corridors or mobility corridors, an important input for transport planning.

Strengths and weaknesses: The simplicity of the CMM method is that it is based on an accounting identity. On the other hand, when information is canvassed from individuals during the census operations, they are asked if they had changed their place of residence. One advantage of the cohort method is that we do not have to worry about the veracity of answers by respondents to the questions on whether they changed their place of residence. Of course, we would need precise estimates of age group-specific mortality rates. Once the RGI releases district level in-migration and outmigration tables it would be a simple exercise to contrast estimates based on the indirect method with the estimates based on responses to the questions in the Census of India. An obvious limitation of the cohort-based approach is that we do not have estimates of in-migrants and outmigrants by source destination district pairs. Also, we do not have reasons for in-migration into a district and outmigration from a district.

In an ideal situation, the estimates of migration from the census and the indirect estimates based on the cohort method should be in the same ballpark. The census reports that a total of 139.1 million individuals migrated in the intercensal period 2001–11 (Table 2). However, estimates based on the CMM method are lower than the actual number of migrants as reported by the census. Could the difference be accounted for by the size of intra-district migrants? We will need detailed tables to be released by RGI to answer this question.

Turning to the second approach, the survey starts off with an assumption that the use of "net annual flows of unreserved passenger travel" is a valid proxy for work-related migrant flow. There is no proper justification provided for this assumption. The estimate that nearly 9 million individuals migrate for work-related reasons every year is higher than any competing estimates. As per the Census of India, in the period 1981–90, 1991–2000 and 2001–10, an estimated 9.9 million, 14.5 million and 18.7 million individuals respectively moved on account of work (Table 5). It is evident that the estimate based on railway data for the years after 2011 is higher by a multiple of 4.5 times. Also note that while the number of individuals moving on account of work did increase, the importance of migration for work among the various reasons for migration declined.

To argue that 9 million of individuals changed their place of residence is incongruous with India's failure to create jobs. India's low employment elasticity of growth has been a recurring subject in *Economic Surveys*. The *Economic Survey 2012–13* asked the pointed question "where will good jobs come from?" Even the current 2016–17 survey mentions that "creating jobs is India's central challenge." So it is surprising that the authors do not attempt to reconcile the apparent inconsistency between the lack of work opportunities and their argument that large number of individuals are migrating for work.

In the survey, there is a brief discussion on the twin issues of seasonal migration and daily commuting by workers. In the discussion that follows, we establish that seasonal migration and commuting flows are sizeable. They are comparable, if not larger than estimates of permanent migration. Both these phenomena are driven by delocalisation of jobs. Be it in terms of providing affordable mass rapid transit or in terms of the emergence of split households and multilocational households, there is an urgent need for policies to react to these two fastest growing phenomena in the last decade.

Seasonal Migration and Commuting

Indian labour markets are getting integrated because of seasonal migrants and daily commuters (Agrawal and Chandrasekhar 2016; Sharma and Chandrasekhar 2014). While seasonal migration is driven by underemployment during the course of the year, both migration and commuting are driven by delocalisation of jobs. Akin to migration, unemployment rates and

Table 5: Distribution of Migrants by Reason for Migration in Successive Intercensal Periods

Period	Employment	Business	Education	Marriage	Family	Others	Total
Rural							
1981–90	7.3	2.0	3.0	55.9	17.0	14.7	100
	(3.9)	(1.0)	(1.6)	(29.7)	(9.0)	(7.8)	(53)
1991–2000	9.1	0.7	2.0	57.0	21.8	9.5	100
	(5.6)	(0.4)	(1.2)	(35.2)	(13.5)	(5.9)	(61.8)
2001–10	6.1	0.4	2.6	52.1	28.3	10.5	100
	(5.4)	(0.3)	(2.3)	(46.0)	(24.9)	(9.2)	(88.1)
Urban							
1981–90	20.8	4.2	6.4	24.7	32.5	11.5	100
	(6.0)	(1.2)	(1.8)	(7.1)	(9.4)	(3.3)	(28.8)
1991–2000	24.3	1.9	4.6	21.6	37.6	10.0	100
	(8.9)	(0.7)	(1.7)	(7.9)	(13.7)	(3.6)	(36.5)
2001–10	18.1	1.3	3.9	19.4	43.1	14.2	100
	(13.3)	(1.0)	(2.8)	(14.2)	(31.5)	(10.4)	(73.2)

Figures in parenthesis are the absolute numbers in millions.
Source: Census of India Migration Tables.

wage differentials are push and pull factors that affect commuting patterns.

Seasonal migrants: A short-term or seasonal migrant is an individual who is considered a member of the household but periodically stays away for extended periods of time for reasons related to work. Based on NSSO's 2007–08 survey, a short-term migrant is one who "stayed away from the village/town for a period of 1 month or more but less than 6 months during the last 365 days for employment or in search of employment." In subsequent surveys, NSSO brought the minimum 30-day cut-off to 15 days. In 2007–08, a total of 12.58 million short-term migrants lived in rural India (for instance, see Agrawal and Chandrasekhar 2016). They constituted 1.7% of the rural population and less than 0.5% of the urban population. More recent estimates are available only for rural India. The estimates from NSSO's situation assessment survey of agricultural households in 2013 suggest that 8.4 million short-term migrants live in rural Indian agricultural households. This estimate does not include seasonal migrants from rural non-agricultural households. Based on NSSO's survey of land and livestock holdings in 2013, we estimate that 10 million rural households had at least one short-term migrant.

Growth in daily commuters: Emerging literature in India focuses on the workforce that resides in rural areas and commutes to urban areas and vice versa. For those workers engaged in non-agricultural activities, NSSO's survey of employment and unemployment has information on place of residence (rural, urban) and workplace (rural, urban, no fixed place) of workers. In 2011–12, a total number of 8.74 million workers not engaged in agriculture, commuted from rural to urban areas for work, while 3.65 million workers commuted from urban to rural areas. In total, 12.39 million non-agricultural workers commuted between rural and urban areas, in one direction or the other. In addition, 3.87 million and 7.46 million rural and urban workers reported not having a fixed place of work. Thus, nearly 24 million workers could be classified as commuting workers, including those without a fixed place of work. This estimate is on the lower side since it does not include those who commute between cities or between villages.

It is important to note here that it was indeed possible to have a precise estimate of number of workers who commuted between villages and cities based on NSSO's 50th round (1993–94) survey of employment and unemployment. This survey canvassed information on how far the individual travelled within the same village/town (less than 5 km, 5 km–20 km, 20 km and above) or distance travelled to another village/town (less than 5 km, 5 km–20 km, 20 km and above). However, for reasons unknown, recent surveys by NSSO do not have this information.

The fact that a large number of workers commute significant distances for work is evident from other data sources too. For the first time, Census of India 2011 released information on distance travelled by over 156.7 million men and 43.7 million

Figure 1: Distribution of Distance Travelled by Men and Women Classified as Other Workers
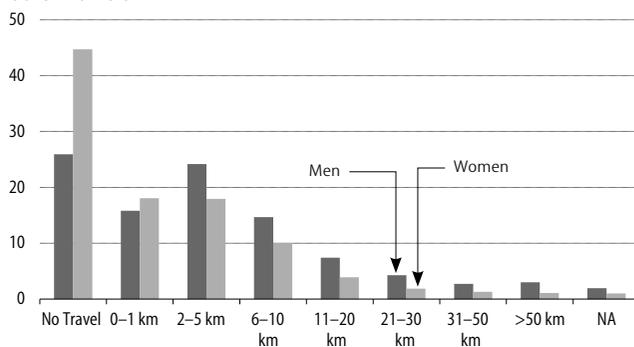
women who could be classified as other workers (that is, those who are cultivators, agricultural labourers or engaged in household industry). There are differences across men and women in distance travelled for work (Figure 1). Women are more likely to report that they do not travel.

On the one hand, nearly 93 million workers either report not having to travel for work or commute less than 1 kilometre. On the other, nearly 31 million individuals travel at least 11 kilometres for work. Needless to say, there are differences in distance travelled and use of motorised and non-motorised transport across rural and urban areas and also across districts.

In light of the sizeable number of individuals who commute for work, it would be of interest to use data on season tickets sold by Indian Railways and also reserved and unreserved tickets sold for distances less than 50 kilometres. Data should also be collected from the state transport corporations and transport services run by municipal corporations to identify the mobility corridors ranked by the number of commuters. A mapping of transport corridors would also help identify areas that need investment in order to promote last mile connectivity, for instance. The collection of gender disaggregated transportation data is specifically useful to inform mobility planning that could lead to inclusive transport solutions. This could positively impact women's safety as well as women's workforce participation, which is an economic imperative for India through innovative policies. The Draft National Policy for Women 2016, for instance, envisages the strengthening of public transport and the promotion of women transport professionals (GOI 2016). Recent reports in the media suggest that the GOI is considering provision of transport services run by women's self-help groups in regions lacking connectivity. A final point is that large transport investments are taking place for improving intra-city and intercity connectivity. The strength of rural–urban linkages is evident from daily movement of workers. Hence, it is important to undertake rural and urban planning within an integrated framework.

Towards Data-driven Policy

Policy interventions for those individuals who change locations permanently, that is, permanent migrants, will be very different from those who move seasonally, or for the short term.

Given that the geographies of migration have remained stable in India, receiving states are in a position to evolve specific policies to cater to migrants. More specifically, the increasing importance of urban–urban migration stream demonstrates that cities are more central in labour migration pathways than before. Cities need to work towards improved urban planning and management, increased supply of affordable housing especially rental housing, extension of basic services to informal settlements where low-income migrants might be concentrated, improvements in public transport especially infrastructure for pedestrians and cyclists, and the political inclusion of migrants. Programmes where portability becomes important are access to public distribution system, health insurance, and admission of children to schools. Improved access to formal banking channels and reducing the costs of remittances also become important. Given the consolidation of migration towards urban areas, skilling and livelihood initiatives like Skill India and National Rural Livelihood Mission currently operational in rural India also need to be freshly strategised. Multiple studies have shown that the construction industry is the single largest absorber of both interstate and intra-state seasonal migrant workers. State governments need to streamline processes and act with a sense of urgency to deliver benefits accruing to these workers under the ambit of Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and Building and Other Construction Workers' Welfare Cess Act, 1996 (for a discussion, see Roy et al 2017).

Despite the growing importance of seasonal migrants, there is an absence of a comprehensive policy framework for addressing this issue. India needs such a policy especially because short-term migrants are more likely to be from poorer households.[3] Detailed data on source–destination pairs, for instance, can help resolve portability of the ration card, permitting migrants to use the public distribution system (PDS) in both locations. Currently, this is not being implemented even within states. However, bilateral interstate agreements[4] have been piloted to resolve portability issues for interstate migrants as well. In the case of children migrating with their parents, it is important to ensure that they can easily get a transfer certificate from the school at their source and get admitted to a school at their destination. Seasonal migration leads to split households or multi-locational households. For instance, it is possible that only the children are left behind while their parents migrate for a short period of time. In order to care for these children, certain state governments, including Odisha (OSCPCR 2013), have enunciated policies and made budgetary provisions for running hostels[5] for left-behind children. In the case of single-male outmigration, there is enough evidence to suggest that it impacts left-behind women disproportionately (Mueller et al 2015). Estimates from the NSSO's *Situation Assessment Survey of Agricultural Households 2013*, reveal that in households with a short-term migrant, among women reporting domestic duties as their usual principal status, 86% report undertaking unpaid work as their subsidiary status. This confirms the view that women from households with a short-term migrant assume a larger set of roles.

Developing Leading Indicators of Migration

If we need periodic data relating to different aspects of mobility it becomes important to make sense of structured and unstructured data available from different sources. Given the existence of useful data in the official system, we ask the question whether they can be translated into information or knowledge. However, while offering these ideas we are cognisant that protection of privacy is a challenge. The government is already in the eye of a storm with privacy concerns over Aadhaar, so we acknowledge that this is a sensitive space for India. The regulatory architecture for agreements between agencies as well as for protection of privacy is a foundational need if we are to leverage administrative, communications, and financial data for the purposes of knowledge building and policymaking.

First, there is a wealth of administrative data within the government system that could be leveraged. For instance, benefits under the Rashtriya Swasthya Bima Yojana (RSBY) are already portable. A migrating individual can also delink RSBY benefits from the household. Tracking the use of RSBY facilities by individuals from varying locations is one way to track mobility. In the future, this can also be done with ration cards when portability is enabled for the PDS. Despite controversies and contestations, the government is already moving ahead with the idea of linking financial transactions like banking services and the use of social services including education and health with Aadhaar. One of the main benefits it sees is the ability to use big data to drive monitoring and evaluation as well as plan outlays and investments. With government databases now largely digital, it is a straightforward process to track a number of indicators from a variety of sources like birth registration, school enrolment, vocational and skills training, university admissions, and job placements by skilling organisations affiliated with the National Skill Mission. Additionally, a growing network of migrant resource centres operational at the panchayat level at source maintains records about outmigrants. These too can be leveraged to concentrate efforts on education, housing, and benefits from PDS at destination.

Extending the methodology used by the *Economic Survey*, ticket sales data from buses operating on state road transport departments can add to our understanding on mobility between specific locations. Given that traditional data sets already show an increase in commuter migration, tracking ticket sales on routes where daily commuting is common would especially sharpen insights on the volume and frequencies of movements along major commuting corridors. Of course, data from private players who do not keep formal track of tickets would be difficult to track. We do recognise that without methodological adjustments, such data is best utilised to plan for mobility and affiliated infrastructure within and among cities and regions rather than to extrapolate it to understand broader migration patterns. The practice of urban and territorial planning is

greatly improved when data has spatial attributes. For instance, the Land Scan data set developed by the Oak Ridge National Laboratory is a spatial data set of global population distribution that measures the distribution and dynamics of population with a spatial resolution using 1 km grids. The data set goes beyond the addition of locational attributes to a spatial data, redistributing census data as per likelihood coefficients calculated from a variety of control variables like land cover, slope, transportation network, and night time lights. The ability to record day-to-day movements of ambient populations recorded in 24-hour averages can be used to measure floating populations at subnational levels, commuter migration and other diurnal movements, capture settlement-level granular data as well forced migration resulting from natural hazards and development-related displacement.

Big data experts see much potential in leveraging digital trails left by users of credit cards, the use of websites and even social media uploads.[6] With digital transactions spiking in the wake of demonetisation in November 2016, India has also begun to seriously look at tracking digital footprints of the financial transactions of individuals, for example, in improving tax collections, but it might be too early to gauge progress on this.

Another type of data that is being leveraged already by fintech firms in India to assess creditworthiness of customers is mobile usage data. Service providers already collect mobile usage data on a continuous basis, but the potential of anonymised mobile phone data is rarely leveraged. Deville et al (2014) demonstrated the creation of spatially and temporally explicit estimations of population densities using anonymised and aggregated mobile phone data in France and Portugal. More significantly, the study demonstrates that mobile phone data can help produce maps of human population changes over multiple timescales, almost in real time. The significance of these methods for migration data can hardly be overlooked, however, several experts have expressed concerns over the privacy of such data (de Montjoye et al 2013). These need to be addressed, perhaps, through a mediated use that only collects aggregate mobile phone tower data and avoids tracking calls and smss from individual mobile phones. To explore the application of such methods in India, we would need an appropriate regulatory intervention to create the right partnership between governments and mobile phone companies and protect privacy. More importantly, from a methodological perspective, we will need to adjust for uneven distribution of communications infrastructure, income inequalities that skew mobile phone usage and other cultural factors.

Way Forward

Keeping in mind the imperative that India needs to plan better for mobility, we highlight some pressing questions and issues for future research. First, whether it be commuting or migration, at a conceptual level it would make sense for us to move beyond the dichotomous framework of focusing on rural and urban. Would it be more appropriate to focus on characterising districts by the nature and extent of rurality as reflected by the employment patterns, composition of output and how interlinked the settlements are with other settlements in the same district and other districts? Different districts of India are at various stages of development. Some districts are in the pre-urban stage where the quality of intra- and inter-district transportation is low, while the larger urban agglomerations are seeking to develop mass and efficient transportation in order to promote deeper interregional integration.[7] Second, how do we strengthen the database? Beyond the recommendations of the Working Group on Migration mentioned earlier, we need to think about how to triangulate data from different sources to better understand the emerging patterns on mobility. Third, the RGI needs to release comparable data on district-to-district migration flows based on Census of India 2001 and 2011 to enable an understanding of migration patterns over time, into city districts and urban agglomerations on the one hand and other cities and towns on the other. These steps are critical to smoothen the structural transformation, in which "Indians on the move" are sure to play a significant role. Forging ahead to set up robust and innovative data repositories is the key to improved social welfare architecture and urban planning and management, both key aspects in integrating migrant workers.

NOTES

1 There are two more streams which we have ignored: unclassified-rural and unclassified-urban.

2 The *Economic Survey* uses migration by workers and all individuals interchangeably thus creating confusion for the reader. A careful reading does suggest that what they eventually arrive at is the estimate of total migration between 2001 and 2011 and not that of workers alone.

3 In rural India, the share of short-term migrants in the bottom 10% of the distribution of monthly per capita consumption (MPCE) was 4.5% and it declined to 1.4% in the top 10% of the MPCE distribution (GoI 2010). Chandrasekhar et al (2015) find that MPCE and MPCE on food is lower in households with a short-term migrant as compared to households without a short-term migrant. Data from NSSO's 2013 survey of agricultural households reveals that households with a short-term migrant are likely to be at the bottom end of the income distribution.

4 For example, a 2012 memorandum of understanding between Andhra Pradesh (erstwhile) and Odisha sought to improve the living and working conditions of brick kiln workers in Andhra Pradesh through interstate coordination mechanisms.

5 Among the issues identified by the Odisha State Commission for Protection of Child Rights in the context of setting up of seasonal hostel for migrant children are the following: identification of migrant children prior to setting up of seasonal hostels, location of hostel that would be subject to the minimum number of eligible children in a village or cluster of villages, universal coverage, prescription of standard care practices at the hostels, clarity on number of months the hostels operate including guidelines for admitting children and to whom the child will be handed over when hostels are closed.

6 Tracking social media usage of tourist arrivals as opposed to traditional methods like feedback forms, for instance, has been used in Austria to inform tourism planning including forecasting and estimation (Koerbitz et al 2013).

7 For typology see Parr and Jones (1983).

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Appendix Table A1: Share of Migrants in Rural and Urban Population

State	1991			2001			2011		
	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
Jammu and Kashmir				15.6	24.4	17.8	20.3	28.7	22.6
Himachal Pradesh	33.4	59.0	35.6	33.5	59.7	36.1	38.4	68.1	41.3
Punjab	31.9	40.1	34.3	34.4	44.2	37.7	43.8	57.5	48.9
Chandigarh	64.5	62.9	63.1	67.2	64.0	64.3	69.8	67.0	67.1
Uttarakhand				33.1	45.0	36.2	39.0	56.1	44.2
Haryana	27.4	43.6	31.4	31.0	47.7	35.8	33.3	60.2	42.7
Delhi	43.4	39.1	39.5	48.0	43.1	43.4	43.8	45.7	45.7
Rajasthan	28.4	30.1	28.8	29.2	28.4	29.0	30.8	37.5	32.5
Uttar Pradesh	21.2	22.4	21.4	24.8	24.8	24.8	26.4	40.6	29.6
Bihar	23.9	31.9	24.9	24.3	27.7	24.7	26.8	37.6	28.0
Sikkim	28.1	57.3	30.8	31.8	56.8	34.6	37.3	61.8	43.4
Arunachal Pradesh	30.2	57.7	33.8	31.0	62.2	37.5	35.7	72.0	44.0
Nagaland	6.2	31.6	10.6	13.2	47.8	19.1	19.4	50.3	28.3
Manipur	6.1	7.3	6.4	17.5	17.2	17.4	27.6	31.1	28.8
Mizoram	12.6	18.8	15.4	22.9	37.7	30.3	24.8	43.7	34.6
Tripura	28.0	37.4	29.5	27.6	42.0	30.1	29.7	44.6	33.6
Meghalaya	12.4	26.5	15.0	13.9	26.6	16.4	23.8	35.4	26.2
Assam	22.3	38.7	24.1	22.7	44.2	25.5	29.9	48.5	32.5
West Bengal	25.4	28.6	26.3	28.9	37.4	31.3	32.8	44.5	36.5
Jharkhand				25.5	34.7	27.6	27.3	44.6	31.4
Odisha	25.0	37.0	26.6	27.9	42.4	30.0	31.7	51.4	34.9
Chhattisgarh				30.5	43.6	33.2	31.4	50.3	35.8
Madhya Pradesh	30.8	39.1	32.8	28.6	34.5	30.2	31.4	44.1	34.9
Gujarat	30.4	38.1	33.1	34.3	44.0	37.9	37.3	54.5	44.6
Daman and Diu	39.6	48.7	43.5	51.4	33.8	45.0	38.1	72.0	63.6
Dadra and Nagar Haveli	27.4	59.2	30.1	25.8	68.5	35.6	33.0	77.1	53.6
Maharashtra	31.3	33.8	32.3	40.2	46.9	43.1	45.4	57.8	51.0
Andhra Pradesh	27.6	34.6	29.5	28.9	35.7	30.8	34.3	49.0	39.2
Karnataka	28.5	32.9	29.9	29.5	34.8	31.3	36.3	48.6	41.0
Goa	43.2	48.6	45.4	56.0	60.5	58.3	77.1	77.6	77.4
Lakshadweep	18.5	23.7	21.4	27.2	34.6	30.5	30.5	30.9	30.8
Kerala	29.1	25.6	28.2	29.0	28.5	28.9	51.7	45.8	48.9
Tamil Nadu	21.8	28.3	24.0	23.1	28.2	25.4	36.7	50.6	43.4
Pondicherry	32.0	31.5	31.7	48.4	46.8	47.3	56.4	55.0	55.5
Andaman and Nicobar Islands	50.0	53.1	50.8	49.3	48.1	48.9	60.3	55.7	58.6
India	26.1	32.3	27.7	28.3	36.4	30.6	32.5	48.4	37.5