India on the Move and Churning: New Evidence

12 CHAPTER

An ideal society should be mobile, should be full of channels for conveying a change taking place in one part to other parts.

– Dr. B.R. Ambedkar

The popular impression is one of an India where labour flows are relatively low. Based on two new datasets and methodologies, this chapter finds high levels of internal work-related migration in India. Analysing the changes in same-age cohorts using Census data yields an annual inter-state migration of about 5-6.5 million between 2001 and 2011. Railway passenger data analysis suggests an annual inter-state migration flow of close to 9 million since 2011. Clearly, rising growth after the 1980s has led to an acceleration of labour migration flows as the rewards of better economic opportunities have overcome the costs of moving. This chapter also documents patterns of railway passenger flows across states and districts which are consistent with priors but also throw up surprises. One such is that language does not seem to be a serious barrier to internal economic integration which if true would vindicate the founding fathers' permissive approach to India's linguistic cleavage. Of course, the striking findings of this chapter and the previous one on trade is deeply puzzling. Across India, income and consumption outcomes are diverging in the face of the equalizing forces of rapid internal integration of goods, people and capital.

I. Introduction and Main Findings

12.1 On Chinese New Year, a staggering 277 million migrants[1]– about 25 percent of the workforce – board trains to return home. In China, high economic growth rates have been accompanied by mass migration from the rural hinterlands to urban hotspots, mainly along the coast.

12.2 Historically, migration of people for work and education has been a phenomenon that accompanies the structural transformation of economies, and has paved the way for the release of "surplus labour" from relatively low-productive agricultural activities to sectors enjoying higher productivity. The resulting remittance flows increase household spending in the receiving regions and further the economic development of less-developed regions.

12.3 Given that higher labour migration

[1] Estimates of the National Bureau of Statistics of the People's Republic of China.

bodes well for a country's economic future, how does India compare to its neighbor? The traditional view, based on a straightforward reading of the 2001 Census, is that the stock of migrants in India is low (around 33 million), and not increasing very rapidly. This chapter instead takes a different view and arrives at a much larger estimate of labour migration in India by analyzing 2011 Census data and railway passenger traffic flows data provided by the Ministry of Railways[2].

12.4 The pattern of flows of people found in this study are broadly consistent with popular conception - less affluent states see more people migrating out while the most affluent states are the largest recipients of migrants. The cost of moving for people is about twice as much as it is for goods – another confirmation of priors (Helliwell, 1997). There are three noteworthy findings that emerge.

12.5 First, India is increasingly on the move – and so are Indians. A new Cohort-based Migration Metric[3](CMM)—shows that annually inter-state labour mobility averaged 5-6 million people between 2001 and 2011, yielding an inter-state migrant population of about 60 million and an inter-district migration as high as 80 million[4]. The first-ever estimates of internal work-related migration using railways data for the period 2011-2016 indicate an annual average flow of close to 9 million people between the states. Both these estimates are significantly greater than the annual average number of about 3.3 million suggested by successive Censuses and higher than previously estimated by any study[5].

12.6 Second, migration is accelerating. In the period 2001-11, according to Census estimates, the annual rate of growth of labour migrants nearly doubled relative to the previous decade, rising to 4.5 per cent per annum in 2001-11 from 2.4 per cent in 1991-2001. There is also a doubling of the stock of out-migrants to 11.2 million in the 20-29 year-old cohort alone. This acceleration has been accompanied by the surge of the economy. As growth increased in the 2000s relative to the 1990s, the returns to migration might have increased sufficiently to offset the costs of moving, resulting in much greater levels of migration.

12.7 Third, and a potentially exciting finding, for which there is tentative not conclusive evidence, is that while internal political borders impede the flow of people, language does not seem to be a demonstrable barrier to the flow of people. Results from a gravity model indicate that political borders depress the flows of people, reflected in the fact that, controlling for distance, labour migrant flows within states are 4 times the labour migrant flows across states. However, language barriers appear not to create comparable frictions to the movement of goods (See Chapter 11) and people within India. The prescient permissiveness of the founding fathers in not dictating a lingua franca for the country appears to have succeeded in making language less salient an axis of cleavage across India, a remarkable achievement given the early anxieties about linguistic divisions (Guha, 2007).

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[2] International migration is not the focus of this chapter. A recent book by Kapur et. al (2016) contains an excellent discussion of Indian migrants in the United States

[3] See Appendix I for a detailed description of Cohort-based Migration Metric.

[4] The Census definition of a migrant is as follows: "When a person is enumerated in census at a different place than his/her place of birth, she/he is considered a migrant". This chapter focuses on inter-state migration.

[5] Earlier work by Munshi and Rosenzweig (2016) suggested that there were significant impediments to internal labour.

12.8 Of course, all these interesting results throw up a deep puzzle as to why greater internal integration has not led to a narrowing of income and consumption gaps across states, as we document in Chapter 10: the co-existence of diverging incomes and consumption alongside the equalizing forces of internal integration of goods, people and capital is a mystery waiting to be deciphered.

II. Baseline Census Data: Migration Levels and Growth

12.9 Before the new estimates and new methodologies are discussed, the basic data provided by the Census is presented. These figures are significant under-estimates (see Box 1), but they still convey the same basic picture, of a surge in labour mobility.

12.10 Table 1 shows that between 1991 and 2001 the growth rates of the workforce and migrants for economic reasons were nearly identical, at 2.4 per cent per annum. But as GDP growth started to soar over the next decade, the two began to diverge. The growth rate of migrants rose spectacularly to 4.5 per cent per annum, while the workforce growth rate actually fell. Thus, the migrants' share of the workforce rose substantially. A breakdown by gender reveals that the acceleration of migration was particularly pronounced for females. In the 1990s female migration was extremely limited, and migrants were shrinking as a share of the female workforce. But in the 2000s the picture turned around completely: female migration for work not only grew far more rapidly than the female workforce, but increased at nearly twice the rate of male migration.

Table 1. Workforce and Migration for Economic reasons, Census 1991-2011

					Growth %	
					1991 to 2001	2001 to
		1991	2001	2011	2011	
Workforce (million)	Total	317	402	482	2.4	1.8
	Male	227	275	332	2.0	1.9
	Female	90	127	150	3.5	1.7
Migrants stating economic reasons for migration (million)	Total	26	33	51	2.4	4.5
	Male	22	29	42	2.7	4.0
	Female	4	4	9	0.4	7.5
Migrants stating economic reasons for migration as a share of workforce, %	Total	8.1	8.1	10.5		
	Male	9.6	10.4	12.7		
	Female	4.4	3.2	5.7		
Migrants who moved within last one year, stating economic reasons for migration (million)	Total	1.4	2.2	3.5	57	59
	Male	1.1	1.7	2.8	55	65
	Female	0.3	0.5	0.7	67	40
Flow/Stock Ratio (%) among migrants who moved for economic reasons	Total	5.4	6.7	6.9		
	Male	5.0	5.9	6.6		
	Female	7.6	12.1	8.2		

Source: **Census 1991, 2001 and 2011. Figures for 1991 adjusted for Census absence in J&K in 1991. Migration data for 2011 are taken from provisional D-5 tables. Economic reasons include work, employment and business. Flow/Stock ratio is migration for duration less than a year divided by total stock of migrants. Compound annual growth rates taken for stocks and simple growth rate used for annual flows.**

III. Re-Estimating Migration: Two Time Periods, Two Data Sources, Two New Approaches

12.11 This section presents two new approaches to estimating migration within India. The first is based on comparing similar cohorts across the two census periods, 2001 and 2011. The second is based on data on railway passenger traffic in the unreserved category for the period 2011-2016. Each is described in turn.

A. Cohort-based Migration Metric (CMM)

12.12 In order to further analyze recent trends in labour mobility, a Cohort-based Migration Metric (CMM) is developed to gauge net migration at the state and district level[6]. This metric considers net migration to be the percentage change in population between the 10-19 year-old cohort in an initial census period and the 20-29 year-old cohort in the same area a decade later, after correcting for mortality effects (See Appendix I)[7].It is likely to capture labour migration, as other bilateral movements for reasons such as marriage are netted out in the equation[8].

12.13 Figure 1 and Table 2 show the change in CMM scores from the 1990s to the 2000s. Among net in-migration states, Karnataka is

Box 1. Estimating the Size of the Migrant Workforce in India

Traditional views on labour mobility in India have held it to be low and stagnant over the years. According to Census 2001, 33 million people or 8.1% of the Indian workforce were migrants for economic reasons. Over 80% of these migrants were male. Labour mobility also appears to be low because urbanization rates have not picked up sharply over the years, changing by roughly three percentage points per decade, irrespective of the urban definition used.

Recent research has however questioned this view. First, labour migration in India tends to be circular[1] in nature in both short and long-term migration streams and is not adequately captured by Census data. Using sectoral workforce data, Deshingkar and Akter (2009) argue that the number of migrant workers exceeds 100 million. Similarly, using National Sample Survey data of 2007-08 that captures short-term migration better than the Census, Mazumdar et. al. (2013) document nearly 70 million migrant workers in India comprising 17% of the workforce of the survey year. Second, female migration for work is concealed in 'reason-for-migration' statistics because the principal reason given to the enumerator is 'marriage' or 'moved with household.' Using NSS 2007-08 data separately on migration and worker status, it can be shown that migrants comprise 29% of the workforce (GoI 2017, Srivastava 2011). Alternatively, nearly 20% of rural households had at least one out-migrant for work in 2007-08 (Tumbe 2015). Third, commuter migration for work across the rural-urban divide is also substantial in India, exceeding 10 million people in 2009-10 (Chandrasekhar 2011). Fourth, the slow pace of Indian urbanization is rooted in the demographic divergence between rural and urban natural growth rates and not necessarily in low or stagnant rates of migration (Tumbe, 2016).

While Census migration data is useful to understand certain aspects of migration, it has its limitations in capturing circular migration and female migration for work. Alternative estimates noted above place the share of migrants in the workforce to lie between 17% and 29%. As per Census 2011, the size of the workforce was 482 million people and based on extrapolation, this figure will exceed 500 million in 2016. If the share of migrants in the workforce is estimated to be even 20%, the size of the migrant workforce can be estimated to be over 100 million in 2016 in absolute terms.

[1] Circular migrants are individuals who migrate from place to place for temporary periods.

[6] At the time of publication, the Census had only released provisional D-5 migration tables, thus constraining the analysis possible using Census migration data.

[7] The focus on the 10-19 cohort has the advantage that it is less contaminated by other reasons for migration such as marriage.

[8] According to Census 2001, migration outside a district comprised nearly 50 per cent of all migration for economic reasons among men. International migration is also part of this metric but the volume is low as proportion to overall population. Kerala is one exception and figures are adjusted for it as explained in the Appendix.

Figure 1. State level Cohort-based Migration Metric: 2001-11 vs. 1991-2001

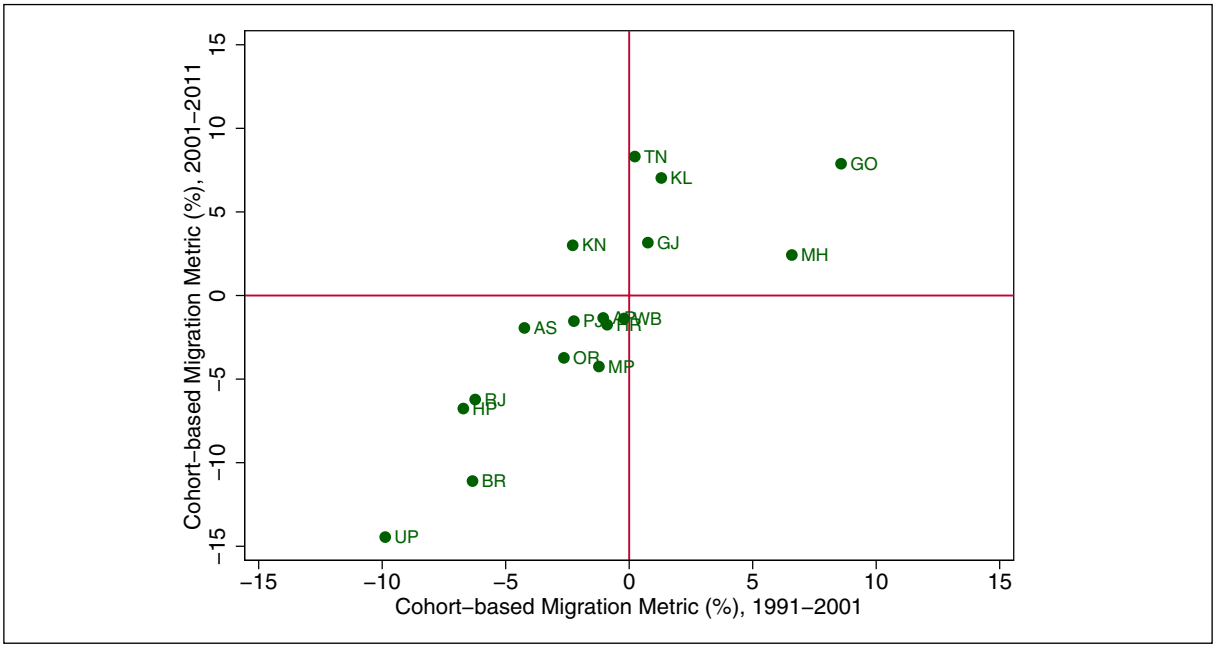


Table 2. Cohort-based Migration Metric (CMM) in selected states, 1991-2011

State	CMM 1991-2001 (%)	CMM 2001-2011 (%)	Net Migrants in 20-29 cohort, 1991-2001 (Thousands)	Net Migrants in 20-29 cohort, 2001-2011 (Thousands)
Delhi	46.1	15.6	887	466
Tamil Nadu	0.2	8.3	26	1,013
Goa	8.6	7.9	22	19
Kerala	1.3	7.0	395	900
Gujarat	0.8	3.2	69	343
Karnataka	-2.3	3.0	-224	348
Maharashtra	6.6	2.4	1,064	507
Andhra Pradesh	-1.1	-1.3	-148	-218
West Bengal	-0.2	-1.4	-30	-235
Punjab	-2.2	-1.5	-99	-82
Haryana	-0.9	-1.7	-34	-86
Assam	-4.2	-1.9	-209	-114
Odisha	-2.6	-3.7	-173	-290
Madhya Pradesh*	-1.2	-4.2	-166	-765
Rajasthan	-6.2	-6.2	-602	-791
Himachal Pradesh	-6.7	-6.8	-80	-90
Bihar*	-6.3	-11.1	-1,135	-2,695
Uttar Pradesh*	-9.9	-14.4	-2,955	-5,834
Total (Major Sending States)			-5,855	-11,200

Source: **See Appendix I for note on constructing CMM and adjustment of international migration figures for the state of Kerala (KL). *denotes undivided state.**

a recent entrant (see the northwest quadrant of the figure). Internal migration rates have dipped in Maharashtra and surged in Tamil Nadu and Kerala reflecting the growing pull of southern states in India's migration dynamics. Out-migration rates increased in Madhya Pradesh, Bihar and Uttar Pradesh and have dipped in Assam.

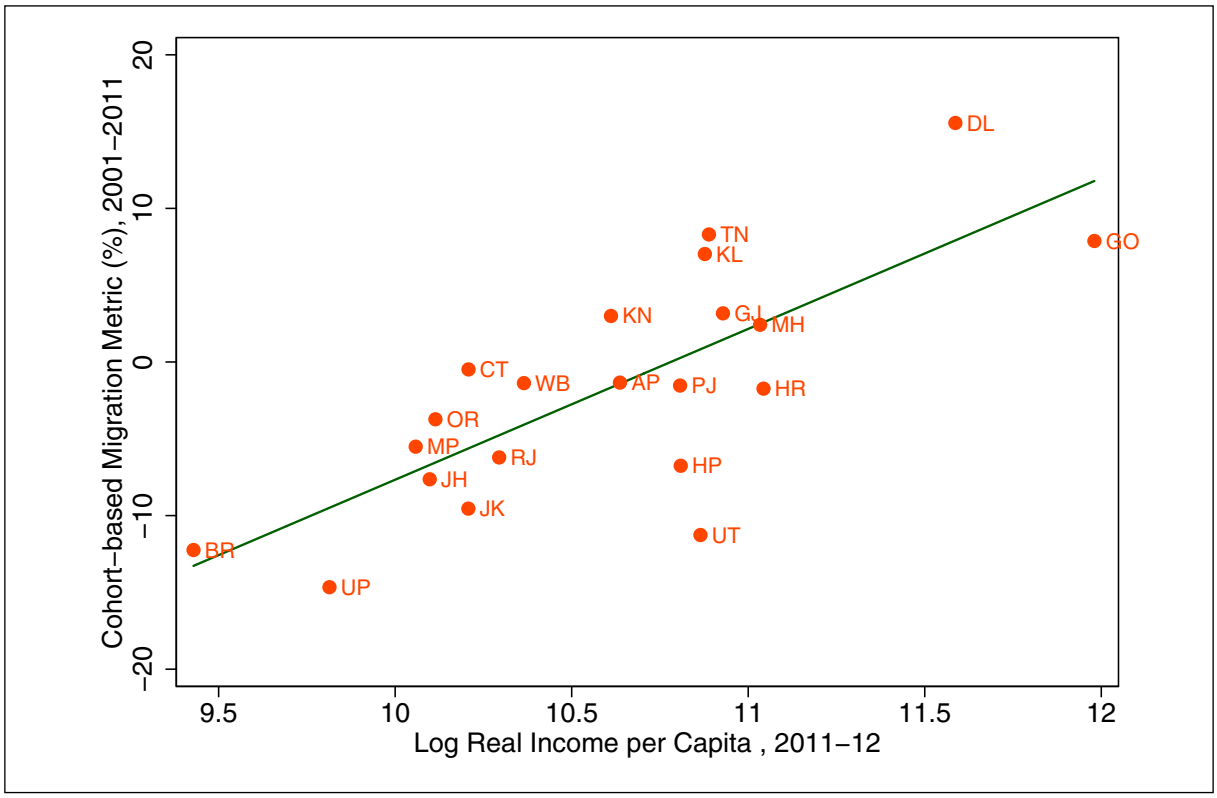
12.14 To illustrate the CMM analysis further, Gurugram district, known for high in-migration, shows a jump of 29 per cent between 2001 and 2011 in the age cohort whereas Azamgarh district in eastern Uttar Pradesh, known for high out-migration, shows a reduction of 24 per cent, after adjusting for cohort mortality. Their CMM scores are therefore 29 and -24 respectively. Similarly, the CMM score at the state level ranged from -15 (Uttar Pradesh) to +15 (Delhi) for the period 2001-11.

12.15 Figure 2 shows the strong positive relationship between the CMM scores and per capita incomes at the state level. Relatively less developed states such as Bihar and Uttar Pradesh have high net out-migration. Relatively more developed states take positive CMM values reflecting net in-migration: Goa, Delhi, Maharashtra, Gujarat, Tamil Nadu, Kerala and Karnataka.

12.16 The sum of all the out-of-state net migrants in the 20-29 age cohort for the period 2001-11 exceeded 11 million people, up from around 6 million people in the 1991-2001 period. Nearly 80% of these migrants were male in both periods.

12.17 As per Census 2001, the 20-29 age cohort formed a fifth of all migrants and of all migrants who moved for economic reasons respectively. Using a scaling factor of five, the number of out-of-state net migrants

Figure 2. CMM vs. Real Incomes across States



Source: **See Appendix I for note on constructing CMM and adjustment of international migration figures for the state of Kerala (KL). CSO data used for real incomes.**

between 2001 and 2011 can be estimated to be over 55 million people using the CMM methodology.

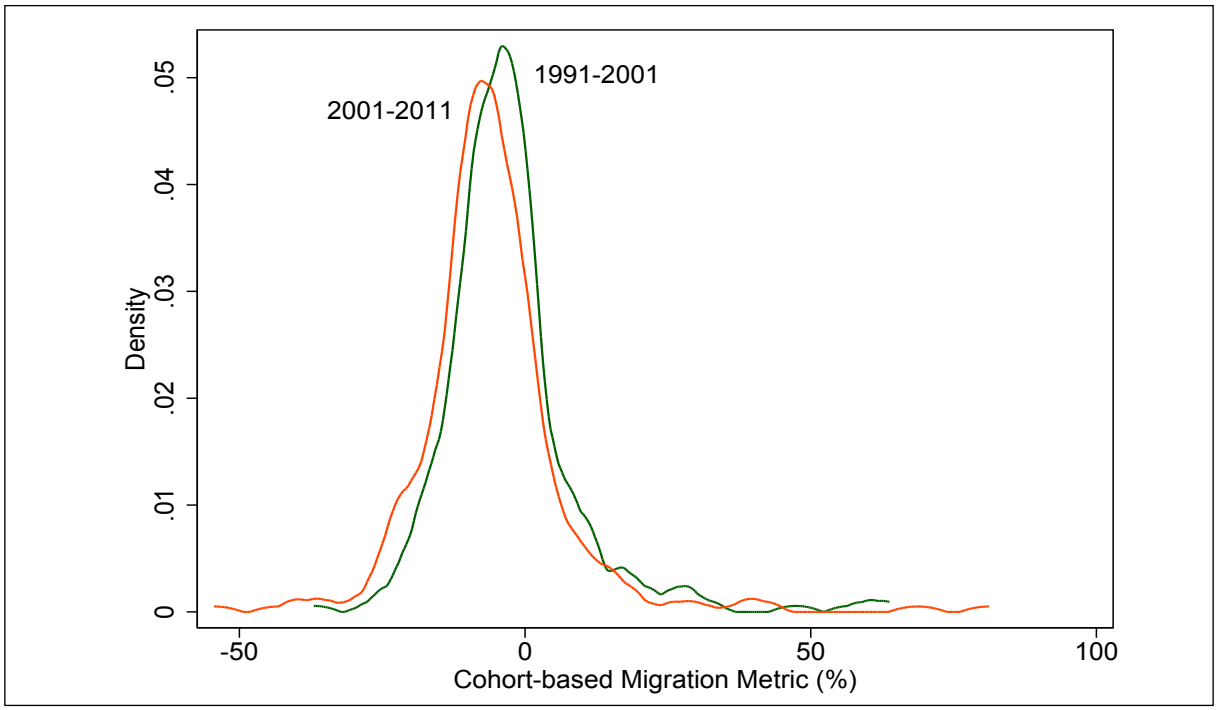
12.18 Figure 3 shows the distribution of CMM scores at the district level for the 1991-2001 and 2001-2011 periods.[9] The distribution of CMM scores shifts left over this period reflecting that out-of-district migration is emanating from a growing number of districts in India. The range of the distribution also increases over time, indicating that the number of high-mobility districts (both sending and receiving) is growing.[10]

12.19 The sum of all the out-of-district net migrants in the 20-29 age group during 2001-11 exceeded 16 million, nearly 75 per cent being male. As with the previous analysis at the state level, using a scaling up factor of five for the remaining cohorts yields an all-India estimate of over 80 million out-of-district net migrants in India.

12.20 Table 1 in Appendix I lists some of the prominent high-mobility districts in India based on extreme value CMM scores, highlighting those districts that have recently witnessed high levels of mobility. Districts with high net in-migration tend to be city-districts such as Gurugram, Delhi and Mumbai. Districts with high net out-migration are located in the major sending states such as Uttar Pradesh and Bihar

12.21 Another important development is the growing role of female migrants. Until the 2000s, migration was largely a male dominated phenomenon. But in the 2000s there was a marked shift in the distribution for females (indicating more outflows), indeed much more than the shift for males, consistent with the discussion in the section on Census data (Figures 4A and 4B).

Figure 3. CMM Distribution at District Level



(*Source:* See Appendix I for note on constructing CMM.)

[9] Sample is restricted to around 300 districts with unchanged boundaries between 1991 and 2011, representing 60 per cent of the Indian population.

[10] Results holds even after excluding districts with high international out-migration, as captured in NSS 2007-08 data.

Figure 4A. CMM Distribution at District Level, Females

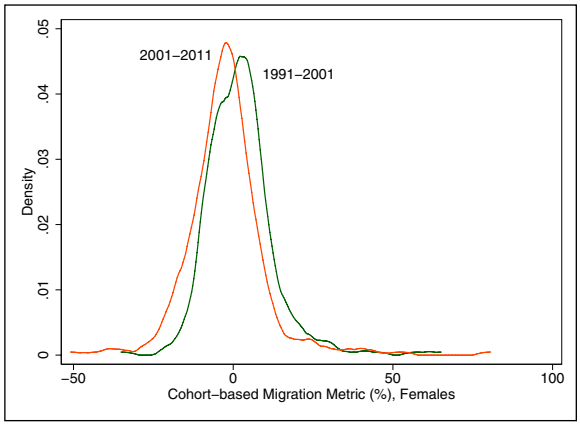
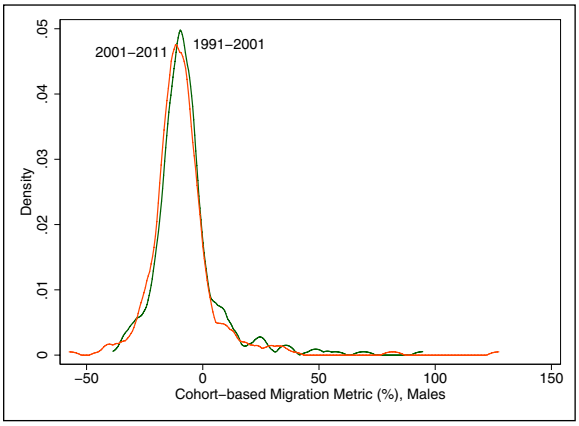


Figure 4B. CMM Distribution at District Level, Males



Source: **See Appendix I for note on constructing CMM**

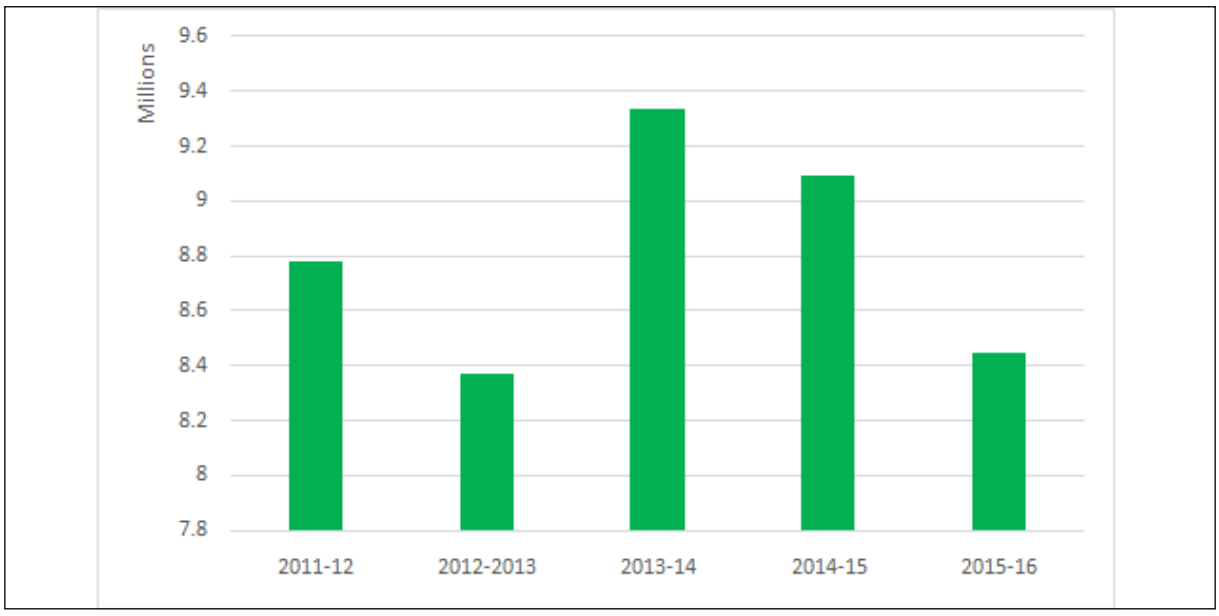
B. Railway passenger data based migration metric

12.22 Monthly data was obtained from the Ministry of Railways on unreserved passenger traffic between every pair of stations in India for the years 2011-2016. The details of the analysis are explained in Appendix II, but the key idea is to use net annual flows of unreserved passenger travel as a proxy for work-related migrant flow. This class of travel serves less affluent people, who are more likely to travel for work-related reasons. It is also relatively unconstrained by capacity, hence reflecting the demand for travel, whereas reserved passenger traffic is more likely to be constrained by the supply of seats. The main findings are described below.

Magnitude and patterns of migration

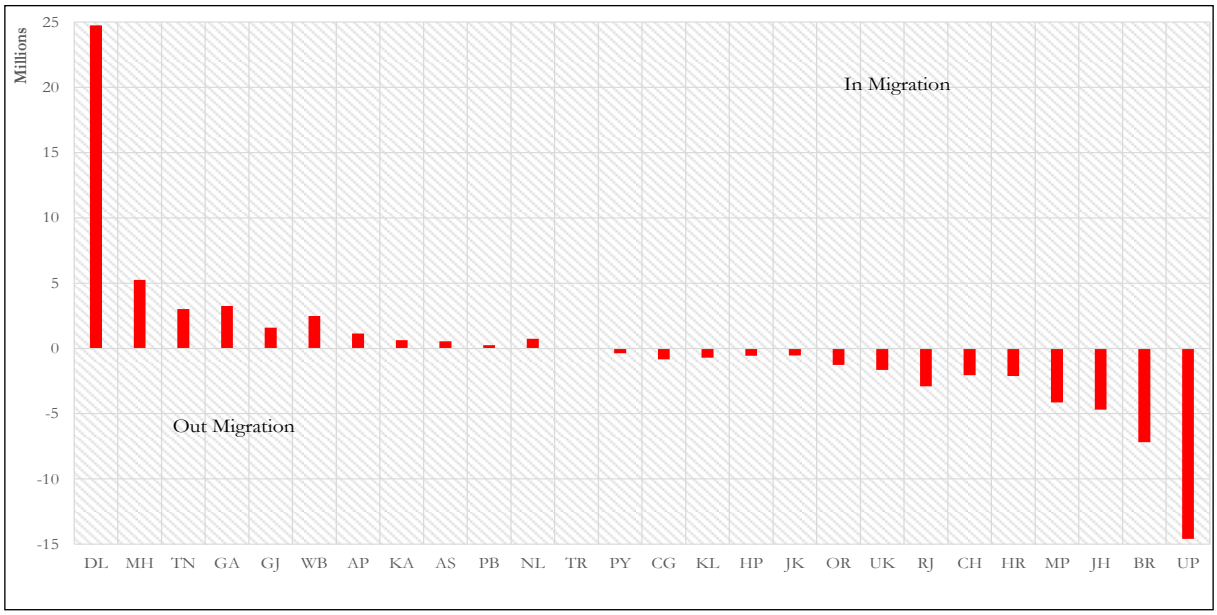
12.23 Figure 5 shows the all India net annual passenger flows for India for the last five financial years starting 2011-12. Net

Figure 5. Total Net Flows at All India Level



Source: Survey **Calculations**

Figure 6. Average Net Flows at State Level



***Source: Survey* Calculations**

flows at the All-India level have averaged close to 9 million[11], peaking around 2013-14, considerably above levels suggested by the Census[12] (Table 1).

12.24 Figure 6 shows the net flows for the 26 states. Positive (negative) numbers denote in (out)-migration. The largest recipient was the Delhi region, which accounted for more than half of migration in 2015-16, while Uttar Pradesh and Bihar taken together account for half of total out-migrants. Maharashtra, Goa and Tamil Nadu had major net in-migration, while Jharkhand and Madhya Pradesh had major net out-migration.

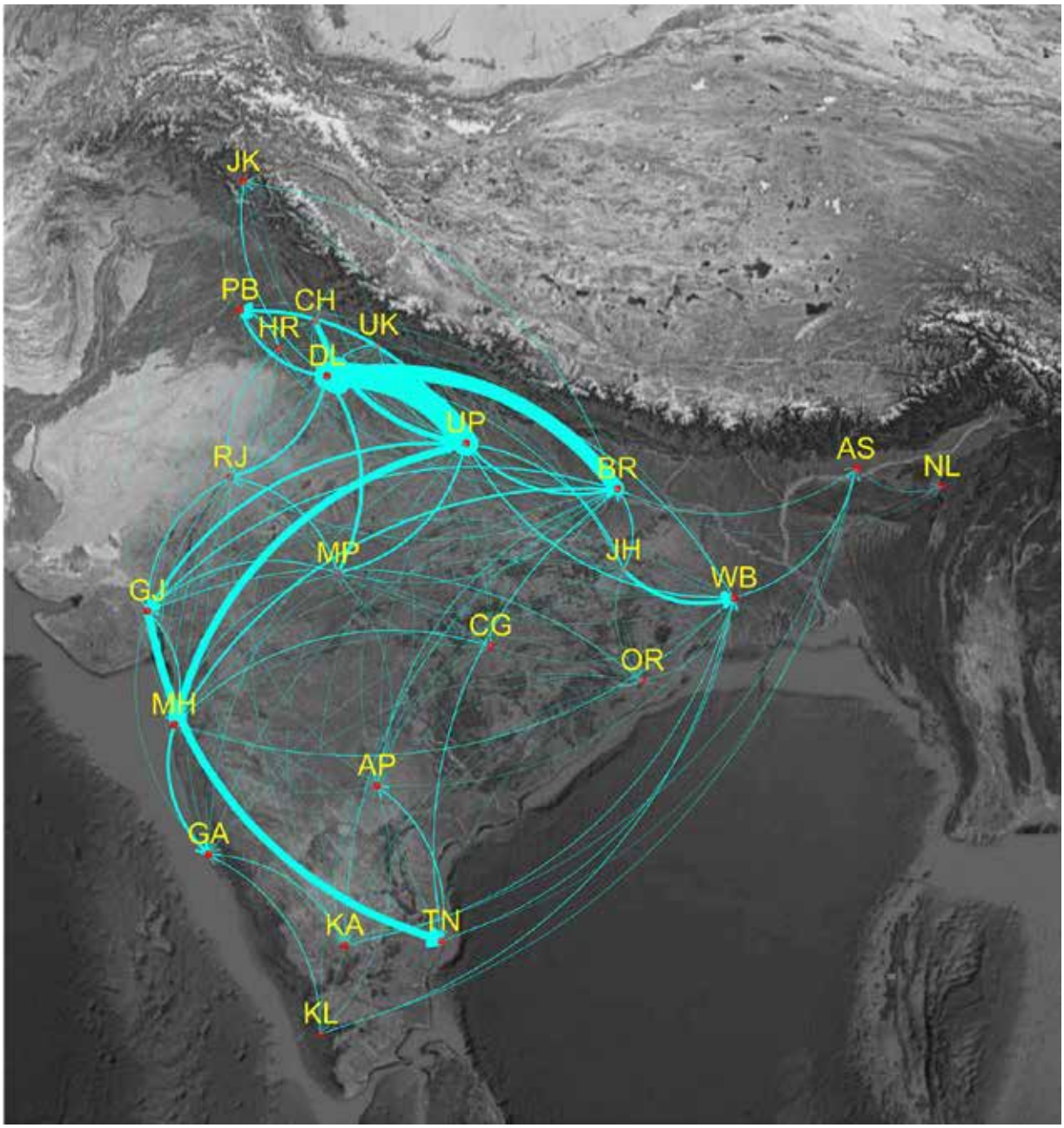
12.25 Figure 1 in Appendix II shows that the impact on migration activity on state labour supply is far more uniform. Out migration is a significant share of the working age population, both in the smaller states (Goa, Puducherry, Nagaland, Chandigarh) and largest states (UP, Bihar, Jharkhand, MP). For India as a whole the annual net flows amount to about 1 per cent of the working age population.

12.26 Figure 7 maps the largest inter-state migration routes. States like Delhi, Maharashtra, Tamil Nadu, and Gujarat attract large swathes of migrants from the Hindi heartland of Uttar Pradesh, Bihar, and Madhya Pradesh. Kolkata in West Bengal attracts migrants from nearby states of Jharkhand, Uttar Pradesh, and Odisha making evident one of the laws of migration propounded by Ravenstein (1885) – "*There is a process of absorption, whereby people immediately surrounding a rapidly growing town move into it and the gaps they leave are filled by migrants from more distant areas, and so on until the attractive force is spent.*" There is an interesting dynamic between Gujarat and Maharashtra where Surat has started acting as a counter magnet region to Mumbai and attracts migrants from the neighboring

[11] This is the net calculated by adding up the positive net values for set of states which are net importers.There can be another all India number calculated by summing up the imports or exports for various states. If the latter calculation is performed, then the net inter-state passenger flows increase to 13 million. When we net the flows across the entire span of the data set rather than annually, our annualized migration estimate is 8.8 million, close to the number reported above.

[12] This may even be a slight underestimate of the flows because we exclude those travelling within 200 kilometers.

Figure 7. Top Inter-State Migration Routes with Highest Passenger Density



districts of Maharashtra. Other counter-magnet region dynamics are observed in Jaipur and Chandigarh (to Delhi).

12.27 While many of the patterns conform to priors, this analysis throws up some real surprises as well. For example, flows from Gujarat to Tamil Nadu are about 7 lakhs annually.

12.28 Figure 8 and Figure 9 show the heat map of the net passenger flows for FY 2015-16 at state and district level respectively. Gross and net level flows were also calculated at state and district level. The Report by the Working Group on Migration (GoI, 2017) has identified 54 districts with a high level of inter-state out-migration intensity. The net flows calculated using railway passenger traffic correctly identifies 40 of these 54 districts (75 per cent success rate). A similar exercise was done to match the out migrant and in migrant districts

Figure 8: State-wise Heat Map for Passenger Flows in 2015-16

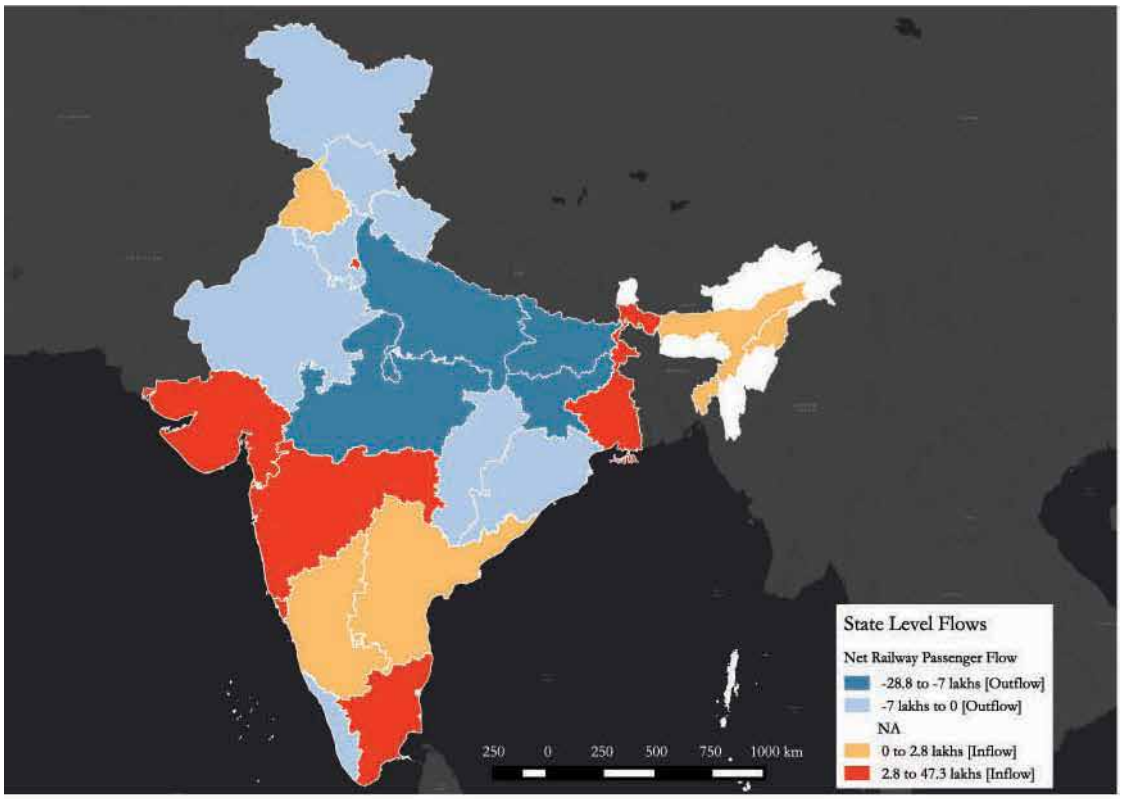
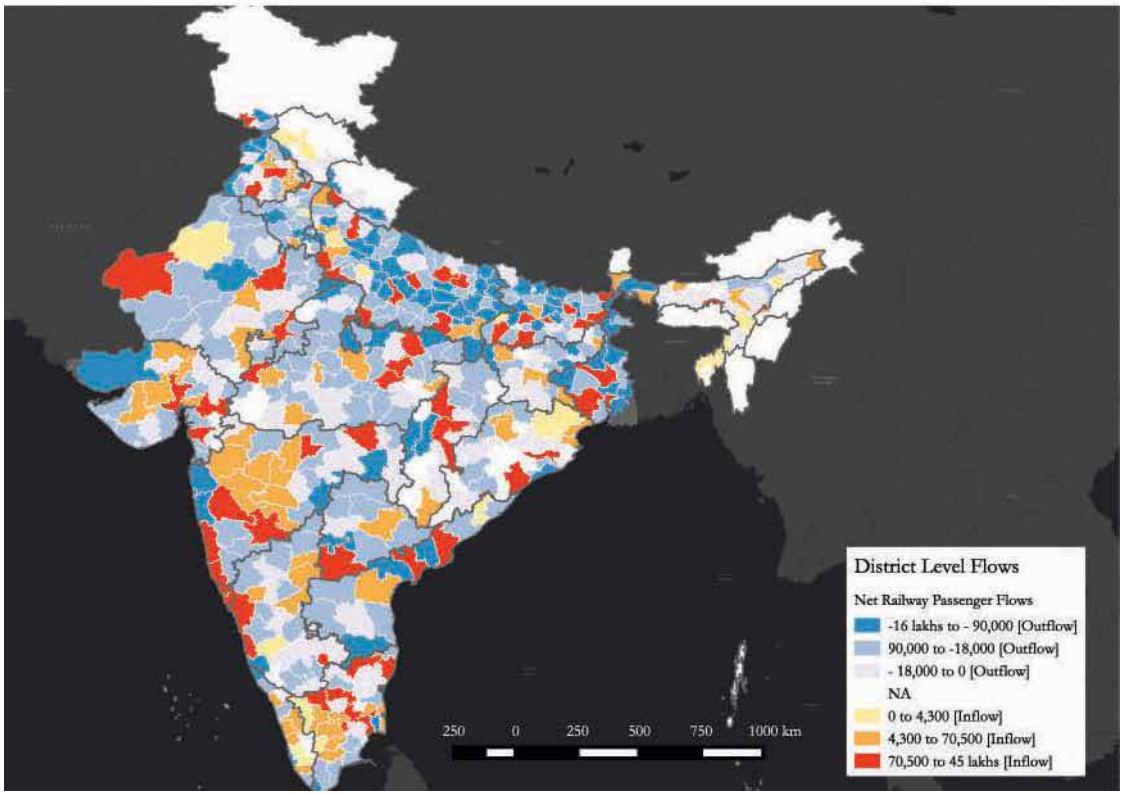


Figure 9: District-wise Heat Map for Passenger Flows in 2015-16



Box 2: Gravity model for migration

Gravity models have been used for analyzing the flow of goods, services and people. Chapter 11 covers its application in the analysis of trade within India.

Gravity model is an empirical observation which finds that the migrant/passenger flows between two geographies is directly proportional to the level of economic activity/population of these two geographies and inversely proportional to some measure of physical distance between the two geographies. Geographers were pioneers in using the gravity models for studying the migration and mobility patterns. Ravenstein (1885) in his work tried to systematically study the patterns of migration. Waldo Tobler (1970) described the gravity equation as the first law of geography, which states that "*everything is related to everything else, but near things are more related than distant things*".

Economists have also been using the gravity equation to study and predict both the flows of migrants between different countries and geographies. Neidercorn J. A. et al. (1969), Raul Ramos (2016), Anderson and van Wincoop (2003), and Anderson (2010) give the details on the theoretical underpinnings (random utility maximization) of the models used by economists to study the migration flows.

Details for preparing the data are provided in Appendix II. As Table 1 shows, the model is estimated for state-level (columns 1 and 2) and district-level (columns 3 and 4) flows. The specifications test the impact of distance[1], common language (Hindi[2] and non-Hindi), and common border between two states[3]. The state-level estimations can also help us test to what extent borders create impediments to flows of people. The results show that for every 1 per cent change in the distance, the net flow of migrants falls by 1.66 per cent[4]. This is broadly in line with other results and is quite robust when the same specification is run over different years. Interestingly, and reassuringly, this coefficient is greater than the comparable coefficient for India's trade flows: clearly people flow less easily than goods.

As expected, the adjoining state border effect (contiguity) is positive suggesting that migration is higher in the adjacent states even after controlling for distance. Interestingly, the common language dummy coefficient does not come out to be significant suggesting that common language between the origin and destination state is not significant in explaining the flow of the migrants. Put differently, not having a common language does not impede the flow of migrants. The results for both net and gross flows are close whether they are estimate at state-level or district-level (the coefficients in columns 1 and 3 are broadly similar as are coefficients between columns 2 and 4).

The district-level estimations allow us to test whether political borders between states impede migration. The same district dummy is positive and statistically significant: the coefficient (in column 4 suggests) suggests that people flows within a state are four times the flows across state borders.[5,6]

1 Distance is proxied by the Great circles distance between state capitals.

2 The Hindi speaking states assigned in this study areBihar, Chhattisgarh, Delhi, Haryana, Jharkhand, Madhya Pradesh, Rajasthan, Uttarakhand and Uttar Pradesh. Others have been assigned as non-Hindi ones.

3 Both origin and destination state/districts fixed effects have been added to capture state specific characteristics of migration. Fixed effects will also absorb GDP and population differences between two states/districts.

4 The results remain same even if the state regressions are run on the net export rather than the net imports for different states. By construction the net numbers are symmetric.

5 Any change in railway routes due to opening of new railway routes, starting of new trains between dyads, improvement of network connectivity has not be taken into account. Dyadic fixed effects have not been incorporated into the regressions as the distance between does not vary over time..

6 Multi level clustering on importing district and year has been done for calculating the robust standard errors.

identified by the CMM measure in section II and those by railway passenger metric. The match was 89 percent (64 out of 72) for out migrants districts[13] and 57 percent (13 out of 23)[14] for the in migrant districts[15].

Formal analysis using a gravity model

12.29 Finally, a statistical analysis of the data based on the gravity model of trade and migration (explained in greater detail in Box

Table 1. Gravity Regression Results

Dependent Variable: Log of Passengers	State-Level Passenger Flows[1]		District-Level Passenger Flows[2]	
	Gross Flows	Net Flows	Gross Flows	Net Flows
Log of Distance	**-1.858*** **	**-1.666*** **	**-1.924*** **	**-1.379*** **
	(0.049)	(0.087)	(0.045)	(0.044)
Language(Hindi) Dummy	**0.150**	**-0.135**	**-0.123**	**-0.053**
	(0.104)	(0.191)	(0.094)	(0.091)
Common Border Dummy	**0.629*** **	**0.324** **	**0.538*** **	**0.390*** **
	(0.089)	(0.157)	(0.044)	(0.040)
Same State Dummy			**1.804*** **	**1.334*** **
			(0.086)	(0.084)
Observations	3,165	1,584	597,395	337,065
R-squared	0.88	0.78	0.54	0.50
1 Fixed effects for: Import State, Export State, Year, Year interacted with Import State, Year Interacted with Export State				
2 Fixed effects for: Import District, Export District, Year, Year interacted with Import District, Year Interacted with Export District				
Standard errors in parentheses *** *p<0.01, ** p<0.05, * p<0.1*				

2) is undertaken. When the analysis is done at the level of inter-state flows, distance has a strong negative effect on labor flows. The impact is roughly twice as much as on flows of goods (see Chapter 11). This result is broadly identical when the analysis is done at the level of inter-district migration. There is a strong contiguity effect; even controlling for distance, states that share common borders see about 65 per cent more migration between them than states that do not share such a border.

12.30 We find that there is a border effect in the sense that migrant flows between states are lower than flows within states. Our estimates suggest that on average flows within states are around four times the flows across states. Kone et al., (2016) using a different specification, find this coefficient to vary between 8 and 2.8 for same-state neighbouring districts vs. same state non-neighbouring districts .

12.31 At the same time, we find little evidence that language is a barrier to the migration flows. When similar analyses are done internationally (Grogger, 2011),

[13] Bhagalpur, Buxar, Gaya, Patna, Rohtas, Vaishali (Bihar); Ratnagiri, Sindhudurg (Maharashtra); Ganjam (Odisha); Agra, Aligarh, Allahabad, Basti, Bulandshahr, Gonda, Mainpuri, Moradabad, Sant Ravi Das Nagar, Varanasi (UP) are the districts identified by GoI Committee and CMM score as out-migrating. Railways Passenger Metric analysis identifies these districts as in-migrating.

[14] Sonitpur (Assam), Chandigarh, Valsad (Gujarat), Gurgaon (Haryana), Mumbai Suburban (Maharashtra), Indore(Madhya Pradesh), Thiruvallur (Tamil Nadu), Gautam Buddh Nagar (Uttar Pradesh) are the districts identified by GoI Committee and CMM score as in-migrating. Railways Passenger Metric analysis identifies these districts as out-migrating.

[15] The discrepancy may be arising in both these cases due to the adjacency of these districts to districts with major terminal railway stations. A hypothesis is that the passenger traffic from(to) the terminal stations to(from) these districts is via non-rail transport, giving rise to the mismatch.

there is a strong language effect, namely that countries with a common language see larger migrant flows. In trade, the common language effect is estimated to be about 16 to 30 per cent more than countries that do not (Subramanian and Wei, 2007) (Rose, 2003). But within India, in both trade and labour flows, language doesn't seem to matter (in the sense that the dummy for Hindi-speaking states is not significant).

12.32 In the spirit of transparency, we now highlight some of the anomalies that our analysis threw up. Kerala in our data appears to be a net exporter of migrants between 2011-12 and 2015-16 which runs counter to priors. Small states and union territories i.e. Delhi, Goa, Chandigarh, Puducherry and Nagaland see large inflows and outflows in comparison to the findings in other studies. These states and union territories are small in terms of area and share boundaries (except Puducherry) with multiple neighboring states. It is possible that migrants are using these places as transit points from where they use other modes of transport to travel to the neighboring states.

IV. Conclusion 12.33 An India on the move is an India of churn, as Dr. Ambedkar observed. These new estimates, showing that migration within India is between 5 and 9 million annually, indicate that labour mobility in India is much higher than has been previously estimated. Another interesting finding of this study is that the acceleration of migration was particularly pronounced for females and increased at nearly twice the rate of male migration in the 2000s.

12.34 The patterns of migration observed conform to priors – less affluent states and districts evince higher out-migration, and rich metropolises attract large inward flows of labour. Over time, there has been a shift towards the southern states, reflecting the opening up of new migration corridors in recent years. Preliminary evidence in the gravity model study suggests the absence of language as a significant barrier in the migration of people – a finding that will surely allay the apprehensions of this country's founding fathers.

12.35 This study predicts an increasing rate of growth of migrants over the years. The numbers show that internal migration has been rising over time, nearly doubling in the 2000s relative to the 1990s. One plausible hypothesis for this acceleration is that the rewards (in the form of prospective income and employment opportunities) have become greater than the costs and risks that migration entails. Higher growth and a multitude of economic opportunities could therefore have been the catalyst for such an acceleration of migration.

12.36 This acceleration has taken place in the backdrop of discouraging incentives such as domicile provisions for working in different states, lack of portability of benefits, legal and other entitlements upon relocation. To sustain this churn, however, these policy hurdles have to be overcome. Portability of food security benefits, healthcare, and a basic social security framework for the migrant are crucial – potentially through an interstate self registration process. While there do currently exist multiple schemes that address migrant welfare, they are implemented at the state level, and hence require inter state coordination of fiscal costs of migration. The domestic remittances market, estimated to exceed Rs. 1.5 lakh crores[16], can also be leveraged to enhance financial inclusion for

[16] This figure is extrapolated from an estimated Rs. 50,000 crores in 2007-08 (Tumbe 2011), growing at an annual rate of 15% p.a., roughly in line with the nominal GDP growth rate. Domestic remittances serve 10 per cent of households in rural India and finance over 30 per cent of household consumption in remittance-receiving households

migrant workers and their families in the source region. Such measures would vastly enhance the welfare gains of migration and encourage even greater integration of labour markets in India.

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Appendix I

1. Cohort-based Migration Metric (CMM)

CMM (t) = 100 x [Population in 20-29 age cohort in Census(t) – Population in 10-19 age cohort in Census(t-10) - Cohort Mortality]/ Population in 10-19 age cohort in Census(t-10)

Cohort Mortality= 10 x Age-specific (10-19) mortality rate per year x Population in 10-19 age cohort in Census(t-10)

Data Source: Population data from the Census 1991, 2001 and 2011 and age-specific mortality data (State level) for the 10-19 age group for the years 1996 and 2006 from Sample Registration System statistics. CMM is calculated at the district and state levels. At the State level, population for Kerala is corrected for international migration using data from the Kerala Migration Surveys conducted by CDS, Kerala.

Table 1. High Mobility Districts in India using CMM Methodology

Districts with high net in-migration [CMM 2001-11 scores above 15%]	Chandigarh; Gurgaon (HR); Delhi*; Gautam Buddha Nagar (UP); Sonitpur (AS); Indore, Bhopal (MP); Surat, Valsad (GJ); Daman; Dadra and Nagar Haveli; Thane, Mumbai Suburban, Pune (MH); Rangareddy (TG); Bangalore (KA); Thiruvallur, Chennai, Kancheepuram, Erode, Coimbatore (TN); Yanam, Puducherry (PY)
Districts with high net out-migration [CMM 2001-11 scores less than minus 15%]	Hamirpur (HP); Uttarkashi, Chamoli, Rudra Prayag, Tehri Garhwal, Pauri Garhwal, Pithoragarh, Bageshwar, Almora, Champawat (UK); Churu, Jhunjhunun, Pali (RJ); Muzaffarnagar, Bijnor, Moradabad, Rampur, Jyotiba Phule Nagar, Meerut, Baghpat, Bulandshahr, Hathras, Etah, Mainpuri, Budaun, Bareilly, Shahjahanpur, Unnao, Rae Bareli, Farrukhabad, Kannauj, Auraiya, Kanpur Dehat, Hamirpur, Fatehpur, Pratapgarh, Kaushambi, Faizabad, Ambedkar Nagar, Sultanpur, Shravasti, Basti, Sant Kabir Nagar, Gorakhpur, Kushinagar, Deoria, Azamgarh, Mau, Ballia, Jaunpur, Ghazipur, Sant Ravi Das Nagar (UP); Darbhanga, Gopalganj, Siwan, Saran, Sheikhpura, Bhojpur, Buxar, Jehanabad (BR); Nalbari, Darrang (AS); Bolangir, Ganjam (OR); Dhanbad, Lohardaga, Gumla (JH); Jhabua, Betul (MP); Amreli (GJ); Ratnagiri, Sindhudurg (MH); Bidar (KA)

Source: **Districts marked in bold italics are high-mobility districts using data for 2001-2011 but not for 1991-2001. State codes presented in parentheses. Data restricted to major states and union territories and excludes districts in Kerala. *Nine districts of Delhi collapsed into one unit for the analysis.**

Appendix II

Description of the data and preliminary results

Centre for Railway Information Systems (CRIS), Ministry of Railways provided the monthly data on tickets booked through the Unreserved Ticketing System (UTS) for travel across different station dyads in India for period between FY 2011-12 and FY 2015-16.

In the first stage, the stations were geocoded and mapped to various Indian states and Indian districts. Data for few stations without geocodes and stations in Manipur, Meghalaya, Mizoram and Arunachal Pradesh were dropped from the analysis[17]. Data for 26 states[18] and union territories was kept in the analysis. In the second stage, the data was aggregated to create Origin Destination dyad passenger flow matrix for each of the Financial Years. Aggregation of the passenger flows over financial years was done to ensure that the results are not impacted by any seasonality and, to check the robustness of the results, passenger flow data was aggregated over the calendar year as well. The passenger flow order and direction between different states remains similar. Around large urban agglomerations like Delhi, Mumbai, Kolkata and Bangalore, there is a large inflow of commuter traffic. Further, the flow of traffic to and from these agglomerations is not symmetric. Commuters close to these urban centres use railways for travelling to these centres and commute back using a different mode of transportation. Two different distance filters were used to remove the imbalance created by this phenomenon. In case 1, any passenger numbers between two stations of less than 200 KM distance[19] were removed from our data. In case 2, the distance filter was set at 150 KM. 200 KM filter was found to be suitable in reducing the possibility of including imbalanced commuter traffic. Hence, that has been used in the analysis. Table 1 shows this Origin Destination dyad matrix for FY 2015-16 with 200 KM distance filter applied.

The Origin Destination dyad matrix was used to calculate the net flows[20] of passengers across different states for all the five years for which data was available. This net flow of passengers for a year can be seen as a proxy for migration[21] between two states[22] as any short term journey for leisure or other purposes than migration is likely to be canceled by a reverse flow in the opposite direction within a year . Table 2 shows this net passenger flows matrix for FY 2015-16. To calculate the aggregate number of inter-state migrants between this period, nets of different years have been added. Robustness check has been performed by aggregating the passenger flow data over multiple time periods of two years, three years and five years. The net flow numbers remain stable across these aggregations. While preparing the district level gross and net passenger flows, 510 districts have been kept in the analysis to create a balanced panel for all the five years. 11 districts (Anantnag, Badgam, Baksa, Baramula, Gajapati, Kulgam, Narmada, Pulwama, Ramban, Reasi, The Dangs) have been dropped in various years for creating balanced panels.

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[17] Passenger flow was very small in comparison to the other states

[18] Telangana has been merged with Andhra Pradesh for the analysis

[19] Great circle distances calculated using the geocoded data

[20] If 100 passengers travel from state A to state B and 80 passengers travel from station B to A then net flow of State A will be 20 (100-80) and net flow of state B will be -20 (80-100)

[21] This measure only captures the unreserved ticketing system train passenger flow nets. It does not capture migration through any other mode of transport. Though for large distances, railways is by far the inexpensive and preferred mode of transportation. Within railways also data for Reserved category travels could have been utilized. The size of the travel there is an order of magnitude smaller than the size for unreserved category and it suffers from supply constraints.

[22] There may be a bias in the origin destination flow numbers between different states if migrants are not travelling directly between two states. Though, it will not affect the net migrant import or net migrant export number for a state.

Figure 1: Total Net Flows as % of Working Age Population

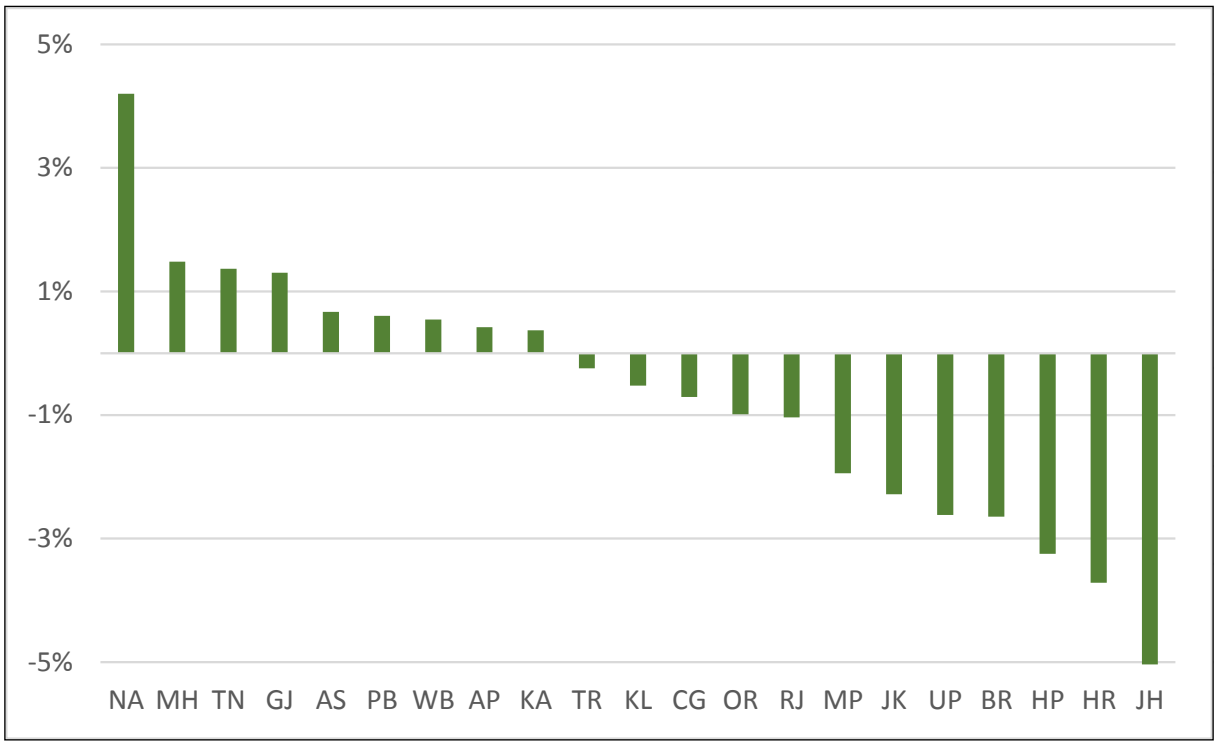

Table 1. States Top routes

Outflow State	Inflow State
Uttar Pradesh	Delhi
Bihar	Delhi
Gujarat	Tamil Nadu
Uttar Pradesh	Maharashtra
Chandigarh	Uttar Pradesh
Jharkhand	West Bengal
Uttar Pradesh	Punjab
Madhya Pradesh	Delhi
Uttar Pradesh	Gujarat
Punjab	Delhi
Maharashtra	Goa
Uttar Pradesh	Bihar
Rajasthan	Delhi
Bihar	Maharashtra
Madhya Pradesh	Uttar Pradesh
Haryana	Punjab
Uttar Pradesh	West Bengal
Bihar	Gujarat
Jharkhand	Uttar Pradesh
Jharkhand	Bihar
Maharashtra	Gujarat
Madhya Pradesh	Rajasthan
Uttarakhand	Delhi
Tamil Nadu	Andhra Pradesh
Jammu & Kashmir	Delhi
Rajasthan	Gujarat
Madhya Pradesh	Gujarat
West Bengal	Delhi
Bihar	Tamil Nadu
West Bengal	Assam

Table 2. Districts top routes

Importing District	Exporting District
Krishna	Chittoor
Ratnagiri	Mumbai
Chennai	Kachchh
Mumbai Suburban	Gorakhpur
Ratnagiri	Thane
Central Delhi	Gorakhpur
Patna	East Delhi
Central Delhi	Gwalior
North Delhi	Shahjahanpur
Sindhudurg	Mumbai
Mumbai	Lucknow
Gwalior	South
Sindhudurg	Thane
Haora	Dhanbad
North Delhi	Azamgarh
Moradabad	Chandigarh
Central Delhi	Jhansi
Vadodara	Mumbai Suburban
Central	Darbhanga
North Delhi	Bareilly
Saharsa	East Delhi
Jhansi	South delhi
Central Delhi	Nalanda
Central Delhi	Lucknow
Central Delhi	Begusarai
Central Delhi	Bhojpur
Ratnagiri	Raigarh
North Delhi	Araria
Saharsa	Amritsar
Mahbubnagar	Guntur