The Great Indian Migration Wave, 1870-2010: Persistence & Consequences

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Abstract

Regions covering over twenty percent of the Indian population have experienced persistent male-dominated, semi-permanent, remittance-based out-migration for over a hundred years. This paper examines the persistence and consequences of this 'Great Indian Migration Wave.' Using district level data spanning over a century, it shows migration persistence over time and the consequences on rural labor markets in the early twenty-first century. Districts with historically evolved out-migration networks today exhibit (a) Higher levels of feminization of the agricultural workforce (b) Higher levels of male employment in the construction and rural non-farm services sector and (c) Higher rural wages for males due to tighter labor markets. These results question prevailing views on 'low' spatial mobility in India and highlight the significance of migration in shaping it's regional economic histories.

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1 Introduction

Between 1872 and 2011, the sex ratio of Ratnagiri district on the west coast of India remained above 1,075 females per 1,000 males, reflecting a persistently high male deficit due to out-migration for 130 years. Even today, the men of Ratnagiri grow up in a culture of migration – migrating to secure work, remitting money to sustain families and eventually returning home to let their sons do the same. Alongside, women grow up in this culture of migration as well – taking on familial responsibilities and that of land for extended periods of time in the absence of men.

This phenomenon of persistent mass male migration and remittance dependency is not restricted to Ratnagiri district alone. Similar experiences can be found within clusters of nearly every State of India: Udupi in Karnataka, Sivaganga in Tamil Nadu, Ganjam in Orissa, Rajnandgaon in Chhattisgarh, Saran in Bihar, Azamgarh in Uttar Pradesh, Hoshiarpur in Punjab, Churu in Rajasthan and many more districts, covering over 200 million people of India.[1] We refer to to these persistent male-dominated, semi-permanent, remittance-based, out-migrations affecting regions covering over twenty percent of the Indian population for well over a century, as the 'Great Indian Migration Wave.'[2] This wave began in a broad-based manner in the 1870s in a period of acute climatic shocks and rising globalization and has lasted till date, with migration magnitudes dipping in the period 1930-1990 when India withdrew from the global economy.[3]

Despite the significance and magnitude of this migration wave, theoretical and empirical debates on economic issues in India routinely dismiss migration to be an important variable. Low migration rates in Census internal in-migration data, low figures of 'official' urbanization and the ignorance of international emigration have led to a view of 'low' spatial mobility that is often attributed to restrictive caste networks (Munshi & Rosenzweig, 2009). Recent research has questioned this view by showing the serious under-estimation of migration magnitudes in contemporary Census data (Deshingkar & Farrington, 2009; Srivastava, 2011) and problems with the Census definition of 'urban' areas.[4] Recent out-migration statistics from the National Sample Surveys clearly show the large magnitude of and rise in spatial mobility. Nearly 20% of rural households in India have an out-migrant for work and remittance-based out-migration rates have doubled in the past two decades.[5]

Against this background, this paper seeks to empirically show the persistence of spatial mobility across twentieth century India and analyze its consequences on rural labor markets in the early twenty-first century. Recognizing the sex-selective nature of work related migration in India, we analyze district level sex ratios of every decennial Census conducted in India between 1901 and 2001. In addition, we examine key labor market variables - sectoral employment shares and sizes and wages- from the nationally representative 64th round 2007-08 National Sample Survey (NSS) on migration and the Census 2001 & 2011 databases.

The empirical results show strong persistence in remittance-based out-migration patterns and

[1] This figure refers to the sum total of district populations in India where the percentage of households receiving remittances exceeds 15% (National Sample Survey (NSS) 2007-08 data) and those districts that have a documented history of migration persistence (Tumbe, 2012c).

[2] Other notable episodes in modern migration history include the 'Age of Mass Migration' in the trans-Atlantic world between 1850 and 1914 and the 'Great Migration' of African-Americans from Southern US to Northern US in the twentieth century. Within India, the other notable mass migration wave was generated by Partition in 1947.

[3] In a separate paper on the 'causes' behind the migration wave, we provide the rationale for this chronology and also descriptive and empirical analysis of migration patterns, rainfall shocks and globalization in the period 1870-1930.

[4] Between 2001 and 2011, the urbanization rate of Kerala jumped from around 25% to nearly 50% on account of reclassification of villages. In separate research, we explore the complex relationship between in-migration, out-migration and urbanization due to serious inadequacies of the current 'urban' definition used in India.

[5] The magnitude of out-migration is discussed in the next section and the rise in mobility is documented by Tumbe (2011).

districts with these out-migrations exhibit (a) Higher levels of feminization of the agricultural workforce (b) Higher levels of male employment in the construction and rural non-farm services sector and (c) Higher rural wages for males due to tighter labor markets. In order to tackle issues of endogeneity related with migration, we use an instrumental variable (IV) strategy that employs the historically evolved out-migration networks as instruments for current migration. The IV estimates give additional support to the results such that the reported associations are likely to be *causal* in nature.

We attribute these empirical results to a sectoral reallocation in rural remittance economies towards the services sector (but not the manufacturing sector) that is strongly gendered with the left-behind or returned men engaged in the non-farm rural sector but a greater concentration of women in the agricultural sector. Higher rural wages for males are attributed to tighter labor markets in the source regions of migration. These results demonstrate a clear relationship between out-migration, gender and labor markets and contribute to the growing literature on the impact of migration on source regions.[6] The results also highlight the significance of remittance economies in shaping the regional economic histories of India.

The rest of the paper is arranged as follows: Section 2 briefly reviews the different types of out-migration in India and their relation with sex ratios. Section 3 provides an empirical analysis of migration persistence over the twentieth century. Section 4 sketches a theoretical framework of the labor market consequences of male out-migration and describes the data, methodology and empirical results. In Section 5, we discuss the empirical results and Section 6 concludes.

2 Migration and Sex Ratios in Contemporary India

In terms of sheer numbers, marriage migration of women due to village exogamy constitutes the largest segment of all migration streams in India (GoI, 2010a). However, as these migrations are largely reciprocal in nature, they do not alter the sex ratios of regions to a significant extent.[7] In contrast, male-dominated work related migrations have a large impact on regional sex ratios as female to male sex ratios are considerably inflated due to the phenomenon of 'missing men' (Bose, 2000) in source regions of migration. Major destination regions such as urban centres in India and in the Gulf region abroad often resemble 'male towns' (Boserup, 1970) with extremely masculine sex ratios. Thus, even though India experiences the phenomenon of 'missing women/females' due to sex-selective abortion and sex-differentials in mortality (especially during childhood), a major source of district level variation in aggregate sex ratios in India is sex-selective migration (Gosal, 1961; Agnihotri, 2000; Tumbe, 2015).[8]

Estimates of the number of migrant workers in India vary from nearly 70 million when derived from the National Sample Surveys (Mazumdar *et al.*, 2013) to over a 100 million when derived from indirect sources (Deshingkar & Akter, 2009) with men usually comprising over 80% of the estimated figure.[9] Over 10 million migrants now reside outside India, around 50% in the Persian Gulf region,

[6] See Mishra (2007) and Dustmann *et al.* (2012) among others.

[7] Marriage migration in response to skewed child sex ratios in other regions (Kaur, 2004) can potentially affect sex ratios in selected regions of India. However, our analysis suggests very low association between female migration rates and 20-49 age group sex ratios.

[8] The large literature on sex ratios and 'missing women' in India has focused on 'juvenile' sex ratios in order to cut out migration noise.

[9] See Mazumdar *et al.* (2013, Table 1). The discrepancy between the two sets of estimates is likely to be wider because the indirect estimate does not count permanent migration. The number of women migrant workers is usually under-reported as they are recorded as migrants due to reasons such as 'marriage' or 'moved with family.' However, even after counting all women workers who belong to a family with a male migrant worker as 'migrant workers', the broad conclusion of heavily male-dominated migration streams for work holds true (Author's estimates from NSS

of which an estimated 80% are male (GoI, 2010b).[10] Since our focus is on the source region, we briefly review the different types of work related out-migrations in contemporary India and then relate them with sex ratios.

Conceptually, three important types of out-migration for work - short-term, semi-permanent and permanent - can be discerned from the migration literature on India. Short-term migrations occur for a few months, either in response to the slack season at home or due to a peak demand period in the destination region. These migrations are mostly seasonal in nature and the migrant spends the bulk of the year at home. While savings are often brought back, periodic remittances do not occur as the migrant is not absent for long periods of time. In contrast, semi-permanent migrants spend a large part of the year away from home and send periodic remittances to sustain their families in the interim. They eventually retire in their native places and are thus not considered as permanent migrants. This three-fold distinction on out-migration is not directly followed by the National Sample Surveys but can be worked out using reasonable assumptions.

The 64th round 2007-08 National Sample Survey (NSS) on migration sampled over 125,000 households and forms the richest source of all-India migration statistics till date. The NSS collected information on short-term out-migration but did not make the distinction between semi-permanent and permanent out-migration. Because migrants' remittances are a critical feature of semi-permanent migrations, we are able to capture this type of migration by the information on remittances. In particular, out-migrations that yielded remittances are considered to be mostly semi-permanent in nature. Therefore, we distinguish between short term or seasonal and longer-term or non-seasonal migrations with the latter category further split into those migrations that yield remittances and those that do not. Their characteristics are described in Table 1.

Short-term or seasonal migration[11] affects roughly 5% of Indian households, is over represented among poorer and 'laborer' households and is largely prevalent in Central India which also has a relatively higher share of *adivasi* population (Tumbe, 2012b; Keshri & Bhagat, 2012). Over 35% of seasonal migrants work in the construction sector, 20% in agricultural activities and 16% in manufacturing activities (GoI, 2010a, p. A-85). These migrations are for relatively shorter distances and are largely rural-urban in nature, often mediated through the presence of labor contractors.

In contrast, remittance-based migrations which affect nearly 10% of Indian households are for much longer distances and durations. Remittances form a crucial link between the native and host region and in 2007-08, over $10 billion worth domestic remittances were estimated to be channeled to source regions of which 80% went to rural households and 60% were Inter-State transfers (Tumbe, 2011). Remittances covered over 30% of the consumption expenditure in remittance receiving households. These migrations are heavily male dominated, under-represented among poorer households and over-represented among households that are 'self-employed in agriculture.' A particular category of households known as 'others' refers to largely non-income generating households and as Table 1 shows, these households are extremely dependent on migrants' remittances. The migrants in remittance-based migration streams work largely in the urban informal economy and industrial sectors and rely on extensive migration networks (Banerjee, 1986; Iversen *et al.*, 2009). Remittance-based migrations can be further split into two – domestic remittance-based migrations affecting over 8% of households and international-remittance based migrations affecting over 1% of households. Figure 1 illustrates the regional variations of remittance based migrations, which is quantitatively the most significant category among all out-migrations for work. It shows some

2007-08 data).

[10] Gender split is computed using information from Zachariah & Irudaya Rajan (2008) and NSS data.

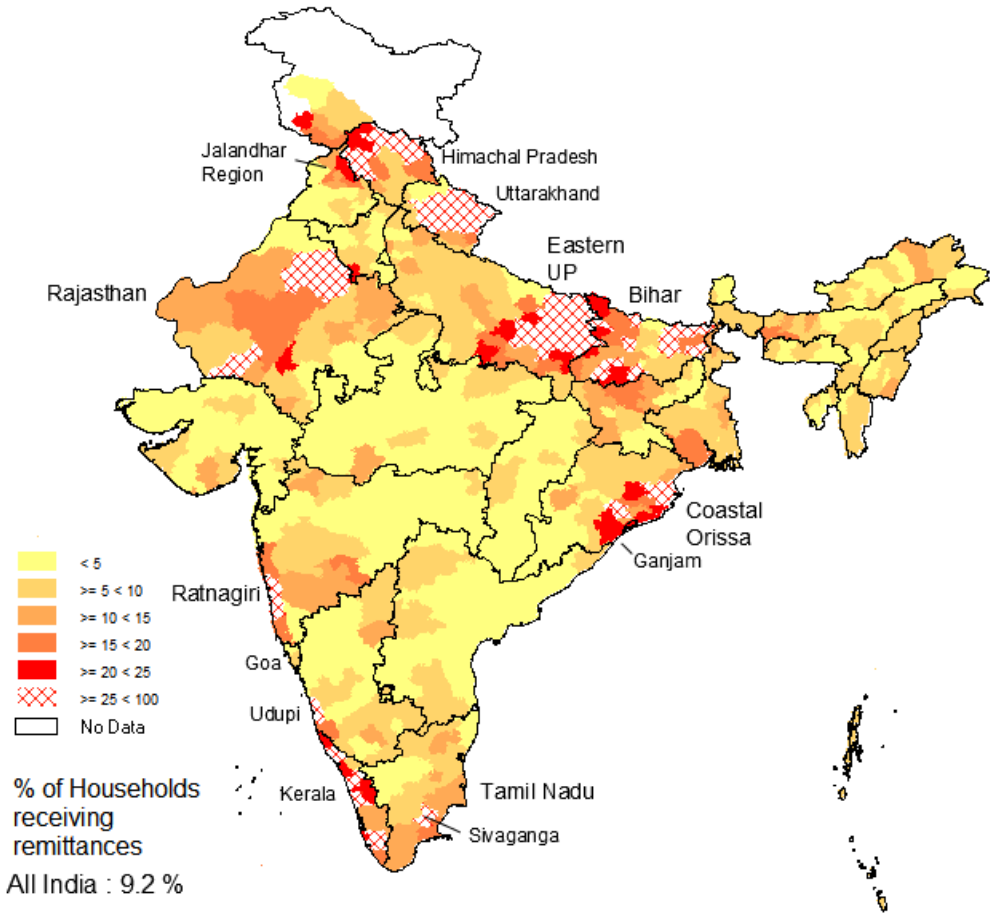
[11] NSS defines short-term migrants as persons who stay away from their usual place of residence for more than 1 month and less than 6 months in a year, for employment or search of employment and the nature of the question elicits responses in the source regions of migration.

Table 1: Out-Migration for Work in India, 2007-08, % of Households

	SSMigHH	RemHH	RemDomHH	RemForHH	NRemHH	OEconHH
(1)	(2)	(3)	(4)	(5)	(6)	(7)
All India	4.5	9.2	8.1	1.2	3.0	16.0
Rural	5.8	11.1	10.0	1.2	3.2	19.2
Urban	1.3	4.6	3.6	1.1	2.4	8.0
MPCE Quintiles (Rural)						
First (Poorest)	9.9	8.1	7.8	0.3	2.4	19.3
Second	7.6	9.7	9.3	0.5	2.4	18.9
Third	6.2	10.6	10.0	0.6	2.8	18.8
Fourth	4.5	11.1	10.1	1.0	3.3	18.0
Fifth	2.7	14.3	11.6	2.8	4.4	20.6
Household Type (Rural)						
Self Employed in Non-Agriculture	5.1	7.6	6.6	1.0	2.9	15.0
Agricultural Labor	7.6	7.2	6.8	0.4	3.1	16.9
Other Labor	9.3	5.1	4.2	0.9	2.3	15.9
Self Employed in Agriculture	4.9	13.6	12.5	1.2	3.4	20.9
Other	2.1	21.7	18.6	3.1	4.0	27.0

Notes: MPCE=Monthly Per Capita Expenditure, HH=Household, SSMigHH=% of HH reporting short-term or seasonal migrants, RemHH=% of HH receiving remittances, RemDomHH=% of HH receiving domestic remittances, RemForHH=% of HH receiving foreign remittances, NRemHH=% of HH with out-migrants for economic reasons and not receiving remittances, OEconHH=% of HH reporting out-migrants for economic reasons. Col. 3 is roughly the sum of Col 4 and 5. Column 7 is roughly the sum of Col. 2, 3 and 6. Source: Authors estimates based on 2007-08 NSS data, with sampling weights.

Figure 1: The Remittance Map



UP=Uttar Pradesh. Source: Author's Estimates based on NSS 2007-08 data at the district level, with sampling weights.

distinct clusters: Most districts along the West Coast between the Arabian Sea and the Western Ghats stretching from Ratnagiri to the state of Kerala; Large parts of the East Coast, especially in Tamil Nadu and Orissa; a large cluster in Eastern Uttar Pradesh and Bihar; the Himalayan states of Uttarakhand and Himachal Pradesh; the Jalandhar region of Punjab and large parts of Rajasthan. International remittances flow primarily to regions along the west coast of India, Northern Rajasthan, Goa, Punjab, Tamil Nadu and major urban centres. A rich regional literature has documented various aspects of migration in all these regions.[12] In contrast, large parts of Central India and the Northeastern region show low levels of remittance-based migrations. These regional patterns can be explained by factors such as population density, historic migration networks and geographic variables, as explained in the next section.

In addition, there are work related out-migrations that do not yield remittances (internal and international), and which may be considered to be more 'permanent' in nature. These migrations

[12]See studies listed in Tumbe (2012a).

affect around 3% of Indian households and are relatively more gender balanced. Taking all these types of migrations into account, about 16% of households in India report work-related out-migrations and this figure is nearly 20% for rural areas and 8% for urban areas.[13] When expressed as a proportion of the total population, average out-migrant ratios in a sample of over 500 districts are above 5%, reflecting mass migration magnitudes in a large number of districts.[14]

To understand the link between out-migration and sex ratios, Figure 2 plots the correlation coefficients between migration variables (using NSS 2007-08 data) and sex ratios, defined as females per 1,000 males, at the district level across various age groups (using Census 2001 data). The correlations for seasonal migrations and non-remittance based migrations are virtually negligible across all age groups but are strong in the case of remittance-based migrations in the core working ages between 20 and 49. For remittance-based migrations, the correlations are negligible in the 0-14 age groups, but then steadily rises to magnitudes as high as +0.6 in the 30-34 age group. It then steadily declines back to zero in age groups in the 50+ category. This is consistent with the feature of migration in core working age groups followed by return migration at older ages. As remittance-based migrations are the most important form of work related out-migrations, the correlations display similar patterns for the 'out migration for work' statistic.

3 Migration Persistence

3.1 Methodology, Variables and Data

In order to identify migration persistence, we run cross-section Ordinary Least Squares (OLS) regressions of the following form,

$$y_i = constant + \beta P_i + \sum_{k=1}^{m} \delta_k \Gamma_{ki} + \epsilon_i \tag{1}$$

where y_i is a district level migration variable based on the 2007-08 National Sample Survey (NSS) dataset, P_i is a variable of past migration that captures persistence (or networks), Γ_{ki} represents the 'k^{th}' control variable out of a total of *'m'* control variables, and ϵ_i is the error term. The key coefficient of interest is β which is expected to be significantly positive for remittance-based migrations and statistically insignificant for other types of migrations.

Each row in the dataset represents a district and the maximum row length is 593 or the total number of districts in 2001. Sample sizes are lower in the regressions because of data limitations on the persistence variable but are in general over 450.

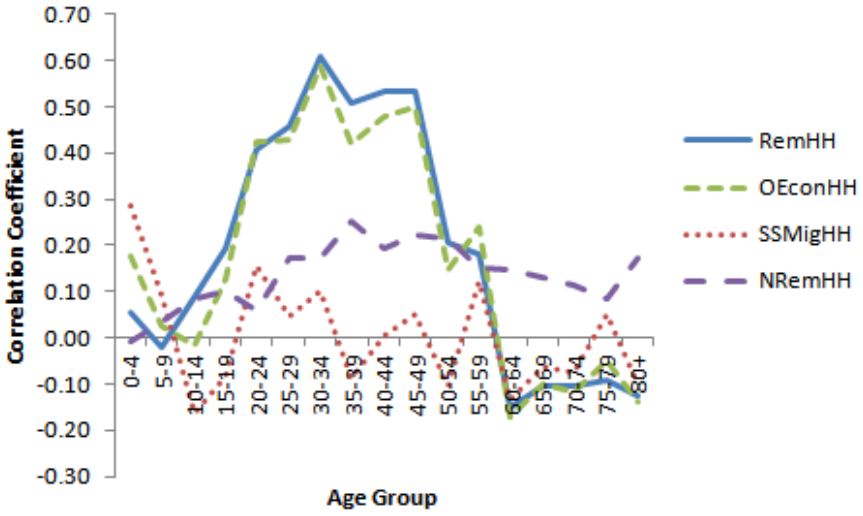
Dependent Variable

The key dependent variable or y_i, is RemHH or the percentage of households receiving remittances in district 'i' in 2007-08, based on 64th round National Sample Survey data. In addition, we consider

[13] There are also entire households that out-migrate, not captured in the out-migration data. The figure for internal migration is about 2% of households (captured from in-migration data). The NSS captures less than half of total international emigrants (Tumbe, 2011). The missing sample is likely to be the migration of high skilled workers to countries like the USA where the migrations are relatively more gender-balanced and sourced from urban areas, and thus unlikely to affect our analysis in any significant manner.

[14] To place these magnitudes in perspective, a figure over 5% is considered to denote 'mass migration' (Hatton & Williamson, 1998, p. 9-10)

Figure 2: Correlations between Out-Migration Variables and Age Group Sex Ratios across districts



Notes: RemHH= % of households receiving remittances, OEconHH= % households reporting out-migration for work (including seasonal migration), SSMigHH= % of households reporting seasonal migration, NRemHH= % Households with out-migrants for economic reasons, but not receiving remittances. Sex ratio is females per 1,000 males. Correlations are between migration variables and age group female to male sex ratios across 534 districts. Excludes districts that have a large presence of (male) armed forces as they are not captured in the NSS migration data. Source: Sex ratio data from Census 2001 Table C-14 and migration data computed from unit level 64th round NSS data (2007-08), with sampling weights.

three other dependent variables. First, we take the lower bound estimate of RemHH on the 95% confidence interval called RemHHlow to address issues of possible measurement error in the key dependent variable - RemHH.[15] Second, we take SSMigHH or the percentage of households reporting seasonal (out) migration and NRemHH or the percentage of households reporting out-migrants for economic reasons but *not* receiving remittances, as a counter-factual dependent variable.

The 'Persistence' Variable

The Indian Censuses have consistently published data on migration on the basis of place-of-birth since the late nineteenth century.[16] However, this data is not suitable for our present analysis for the following reasons (a) Information on out-migration at the district level is limited as the early Censuses reported in-migrants only by their *province* of birth and (b) A significant part of the migrations were international, towards destinations such as Burma, Sri Lanka, Malaysia and other places that were rarely recorded at the district level in any of the country's Censuses.[17]

Instead, we propose to use the historical sex ratio of the district as an indicator of past migration in lieu of the fact that most migration was male-dominated and had a clear impact on the sex ratio in regions experiencing large out-migrations. The sex ratio has the added advantage of capturing both internal and international out-migrations that were widely prevalent in late nineteenth century India. The sex ratio has been used in other studies as well to understand historical migration trends in India - de Haan (2002) for Bihar, Mohanty (1992) for coastal Orissa and Iversen & Ghorpade (2011) for coastal Karnataka.

Figure 3 shows the sex ratio map of India in 1901. These districts correspond to the jurisdiction boundaries as in 2001 and not as those in 1901 so as to facilitate a direct comparison with the data provided by the 2007-08 NSS survey.[18] Most of the regions with sex ratios above 1,050 were regions with substantial out-migrations in the late nineteenth and early twentieth century[19]: Most coastal regions and the regions covering present day Bihar, Jharkhand and eastern Uttar Pradesh.

Figure 3 compares well with the remittance map shown earlier (Figure 1). The visual correlation between the two maps is striking. However, in the north-western regions, sex ratios were also heavily influenced by sex-differentials in childhood mortality leading to severely masculine sex ratios, a feature that persists till date. We address this issue in three different ways. First, State dummy variables control for State specific features and to that extent minimizes the influence of sex differentials in child mortality. For example, in Punjab, a region with extremely masculine sex ratios, districts with high out-migration in the Jalandhar region had relatively higher female to male sex ratios than other districts in Punjab.[20] Second, we can use the deviation of the districts' sex ratio from the regional average as an index of out-migration in 1901.[21] Third, we can use an age-adjusted measure such as the percentage difference between the 20-40 age group sex ratio and

[15]Tumbe (2012b) shows two external validity tests for NSS district level out-migration data.

[16]The first All-India Census was conducted in 1872 and since 1881 the Census have been conducted without interruption on a decennial basis, the most recent being conducted in 2011.

[17]This is one of the major limitations of Collins (1999)'s study as it looks at only in-migration and ignores international emigration.

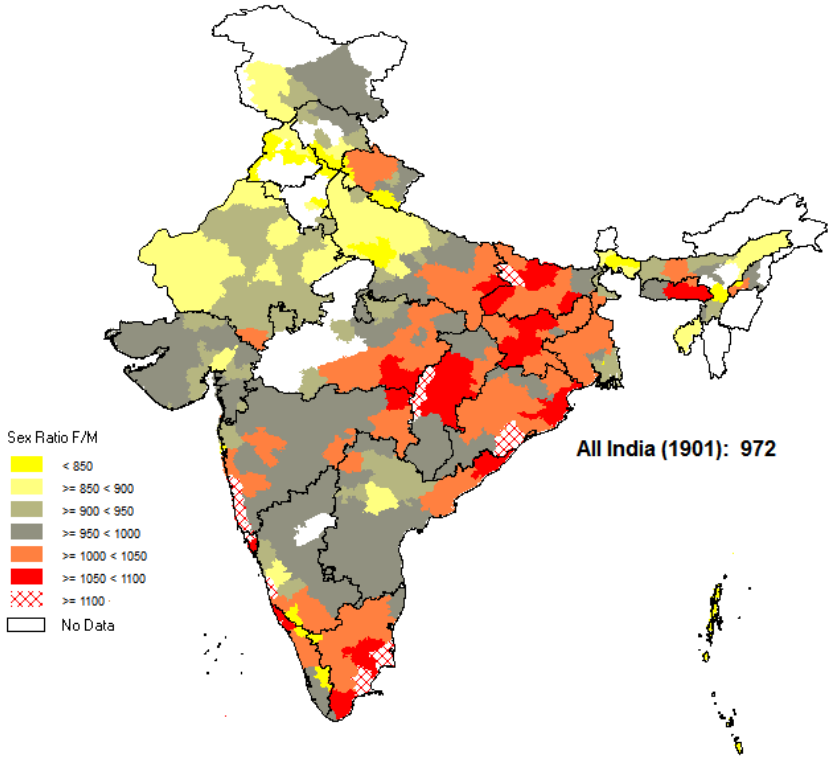
[18]Village and Thana level data enables aggregation at smaller levels as new districts have been carved over time since 1901.

[19]See Davis (1951); Zachariah (1964); Tinker (1974); Chakravarty (1978); Tumbe (2012b) for the discussion on historical migration as well entries listed in the India Migration Bibliography (Tumbe, 2012a).

[20]For example, GoI (1923, p. 82) noted that the people of Hoshiarpur district in the Jalandhar region "depend very largely on earning of service outside the district" and this district has always had the highest recorded female to male sex ratio in Punjab in the 20th century.

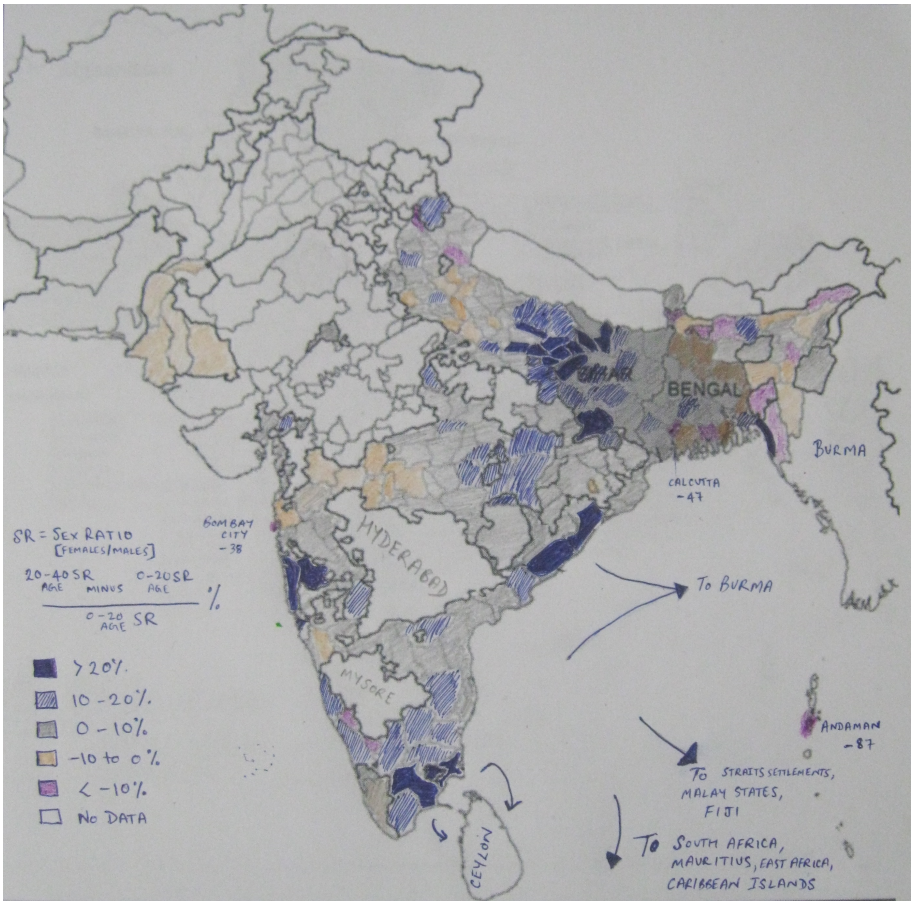
[21]The modern-day states are taken to compute the regional averages. Results do not differ if we take historic provinces for the regional average.

Figure 3: Sex Ratios in 1901 (in 2001 administrative boundaries)



Source: Tumbe (2012b, Figure 7.28), based on Census 1901 data. Notes: Sex Ratio is number of females per 1,000 males. District boundaries not shown. Missing data for some districts is to be updated.

Figure 4: Sketch of Age Adjusted Sex Ratios in 1901



Source: Census of India 1901, various provincial reports. This map uses Map 11 of Roy (2014) as the base template and is work-in-progress.

the 0-20 age group sex ratio that removes the influence of sex-differentials in child mortality.[22]

Figure 4, which is work-in-progress, shows this measure for some provinces in the provincial borders of 1901. The effect of migration is more clearly visible in this map with places known for in-migration (Bombay city, Calcutta city, parts of Assam and Berar) taking negative values on the adjusted sex ratio measure and places known for out-migration taking large positive values. Further, regions in Western Uttar Pradesh now take similar values as in Central India, unlike the map on aggregate sex ratios, as it cuts out the effect of sex-differentials in child mortality.

Based on the above reasoning, in this paper, we use the first two measures of sex ratios as the variable to capture historical out-migration. Within a given region, higher female to male sex ratios should reflect higher rates of (male-dominated) out-migration from that region. Since we have district level data on sex ratios for all Census years between 1901 and 2001, we have 11 variables that proxy historic out-migration - Sex Ratio 1901, Sex Ratio 1911, etc. All these variables reflect data

[22]It does not remove the effect of sex differentials in adult mortality and we assume that the effect is small in comparison to the migration effect.

in the 2001 district boundaries.[23] Our benchmark specifications use the Sex Ratio 1901 variable to measure persistence but we also show results of regressing RemHH on the sex ratios for other Census years. Further, we also categorize the Sex Ratio 1901 variable into dummy variables taking 0-1 values if the district had a sex ratio within certain bands. The coefficients on these dummy variables are easier to interpret than the coefficient on the 'Sex Ratio 1901' variable.

Control Variables

We use a variety of control variables that could explain the spatial variation in out-migration intensities in the source regions: Economic variables such as population density, dependence on agriculture, dependence on rice cultivation, irrigation, poverty and inequality; Demographic variables such as the share of Scheduled Caste (SC), Scheduled Tribe (ST) and Muslim populations at the district level; Geographic variables such as rainfall, coastal dummy and forest cover. Other controls include historical factors that could have shaped out-migration patterns such as a dummy variable for a directly-ruled British district and a variable on the colonial land tenure system (Iyer, 2010; Banerjee & Iyer, 2005).[24] Control variables also include dummy variables for each State to account for State level characteristics that may affect the pattern of migration. In order to account for the spatial nature of the data, standard errors in all regressions are clustered at the NSS region level. The NSS regions divide India into 88 regions broadly on the basis of agro-climatic conditions.

In our sample the average RemHH in 2007-08 was 9.7% ranging from a minimum of 0% to a maximum value of 43%. Data on district level sex ratios in 1901 has been collected as of now only for 497 districts out of a maximum of 593 districts. Due to some outliers, we run regressions for only those districts with sex ratios above 700.[25]

3.2 Empirical Results

Table 2 shows the empirical results of regressions run using the specification shown in Equation 1. Column 1 shows the results of regressing RemHH on Sex Ratio 1901 using only State dummy variables as control variables and as expected, we observe a strong positive coefficient of 0.00042 that is significant at the 1% level. The interpretation is that at the margin, if the district's sex ratio in 1901 was higher by 100 (due to male-dominated out-migration), RemHH in 2007-08 for that district would be higher by .042 or 4.2%. That is, if mean RemHH for a district is 9%, it increases to 13.2%. This is a strong positive association between the two variables.

Column 2 shows the empirical results of regressing RemHH on Sex Ratio 1901 using State dummy variables along with all the control variables. The sample for this regression is much smaller because of data limitations on the 'proportion non-landlord' and 'poverty' variables. We observe that the coefficient on the Sex Ratio 1901 variable continues to be positive and statistically significant at the 1% level. Population density (log) is significant at the 10% level and shows a positive sign. The coefficient magnitude of 0.04 suggests that a doubling of population density (100% rise), raises RemHH by 0.04 or 4%.

More agrarian economies also have a higher RemHH and the "agricultural workers" variable is positive and strongly significant. Rice growing economies have higher RemHH and irrigated areas have lower RemHH though these variables are not statistically significant. Similarly, both poverty and inequality are inversely related with RemHH, against the expectation of a positive relation

[23] The data are obtained fom the District Census Handbooks of 2001 and various other Census reports.

[24] An Appendix providing descriptive statistics and describing all the data sources used in this paper is work-in-progress.

[25] For instance, Andaman and Nicobar Islands was used a jail-house for (mostly male) convicts and shows extremely low sex ratios.

Table 2: Empirical Results

Dependent Variable: RemHH (% of Households receiving remittances, 2007-08)			
	(1)	(2)	(3)
Independent Variables			
Persistence Variable			
Sex Ratio 1901	0.00042***	0.00053***	0.00049***
	(3.48)	(4.01)	(3.90)
Economic Variables			
Rural Population Density on Cultivable Land (Log)		0.040*	0.035*
		(1.80)	(1.70)
% workers in the agricultural sector		0.087**	0.069**
		(2.38)	(2.06)
% Rice cropped area/ Gross Sown Area		0.014	-0.001
% Net Area Irrigated / Net Sown Area		-0.013	-0.014
Backward district dummy			0.004
Rural Poverty Headcount Ratio, %		-0.0002	
Rural Consumption Inequality, Lorenz Ratio		-0.0363	
Demographic Variables			
% Scheduled Caste Population		-0.02	0.006
% Scheduled Tribe Population		-0.106**	-0.089**
		(-2.25)	(-2.36)
% Muslim Population		-0.013	-0.06
Geographic Variables			
Log Rainfall		.071***	.072***
		(3.39)	(3.64)
Coastal Dummy		0.006	0.011
% of reported area covered by Forests		-0.059	-0.059
Other Control Variables			
British ruled district = 1		-0.015	
Proportion of non-landlord area in British era		-0.001	
Number of Observations	493	383	457
R-Squared	0.42	0.58	0.54
State Dummy Variables	Yes	Yes	Yes
Clustered Standard Errors	NSS Region	NSS Region	NSS Region
Number of clusters	79	62	74

Notes: ***Significant at 1% level, **Significant at 5% level, *Significant at 10% level. Constant term is suppressed. T-Stats reported in parentheses under coefficients of selected variables. NSS regions are broadly based on agro-climatic conditions. Sex ratio is females per 1,000 males.

between inequality and RemHH. However, both these variables are not statistically significant, and it appears that the signs may be the result of correlations with other variables. For example, poverty is positively correlated with the "agricultural workers" variable such that its effect may be translated from that variable.

There is a negative relationship between the percentage of STs in a district and RemHH. There is also a strong positive relationship between rainfall and RemHH. Areas which receive double the average annual rainfall are likely to have RemHH higher by 7.1%, controlling for other factors. The coastal dummy variable is positive but surprisingly not statistically significant. This is because the coastal region also receives higher rainfall than most other regions such that its effect is likely to have been captured by the rainfall variable. This is also the likely reason for the low T-statistic on the 'rice' variable noted earlier as rice growing areas also receive more rainfall.

Finally, British ruled districts and the variable on historic land tenure systems, are not statistically significant variables in the regression. These results are unchanged even after dropping districts from Madhya Pradesh and Chhattisgarh from the sample or after recoding them to non-landlord as proposed by Iversen *et al.* (2012) (results not shown). This is not surprising as much of coastal South India experienced large scale out-migrations, even though they were not under landlord systems.

Because the regression of Column 2 restricts the sample sizes due to two variables that are not statistically significant, we run another regression, shown in Column 3 that covers a slightly bigger sample and where rural poverty is replaced by the backward district dummy variable and the 'other' control variables are dropped. Similar results are obtained as in Column 2.

The key inference from Table 2 is that the coefficient on the persistence variable is positive and highly significant. That is, spatial variations in out-migration patterns in the late 19th and early 20th century, correlate strongly with the spatial variations in remittance-based out-migrations in the early 21st century, after controlling for observable factors.

Table 3 provides regression results using different dependent variables. Column 1 of Table 3 is identical to Column 3 of Table 2 , our baseline regression, where RemHH or the percentage of households receiving remittances is the dependent variable. Column 2 shows the results when the lower bound estimate of RemHH is used as the dependent variable. The results are almost identical to Column 1, except that many coefficients now have smaller magnitudes. The persistence variable continues to be highly significant.

Column 3 of Table 3 shows that the persistence variable is not significant when SSMigHH or seasonal migration households is the dependent variable. Poverty, low industrialization and lack of irrigation appear to be better predictors of seasonal migration than for remittance-based migrations.

Column 4 of Table 3 shows that the persistence variable is not significant for households reporting out-migrants for economic reasons but *not* receiving remittances. It should also be noted that the R-squares of the regressions with RemHH as the dependent variable are above 0.5 but substantially lower for the other types of migrations.

The empirical results shown in Table 3 make a strong case that it is remittance-based migrations that correlate well with the persistence variable and not other types of migrations.

Finally, Table 4 shows the empirical results using different persistence variables. The first row shows the results of the baseline regression (Column 3 of Table 2). The second row shows the results when the Sex Ratio 1901 variable is broken into dummy variables, each representing a sex ratio band. All the dummy variables are significant and most importantly, rise monotonically with the bands. The interpretation is that districts with sex ratios above 1,100 in 1901 are likely to have RemHH in 2007-08 higher by 15.1% than those districts with sex ratios below 900 in 1901 (the base category). Another inference is that districts with sex ratios above 1,100 in 1901 are likely to have RemHH higher by 5.4% (15.1 minus 9.7) than districts with sex ratios between 1,050 and 1,100 in

Table 3: Regression Results with different dependent variables

	Dependent Variable			
	RemHH	RemHHcl	SSMigHH	NRemHH
	(1)	(2)	(3)	(4)
Independent Variables				
Persistence Variable				
Sex Ratio 1901	0.00049***	0.00037***	0.000007	0.00002
	(3.90)	(3.91)	(1.07)	(1.18)
Economic Variables				
Rural Population Density on Cultivable Land (Log)	0.035*	0.028*	0.014	-0.0066
	(1.70)	(1.78)	(1.03)	(-1.54)
% workers in the agricultural sector	0.069**	0.059**	0.078***	0.0076
	(2.06)	(2.21)	(2.93)	(0.65)
% Rice cropped area/ Gross Sown Area	-0.001	0.0009	-0.0066	-0.018*
% Net Area Irrigated / Net Sown Area	-0.014	-0.014	-0.055**	0.004
Backward district dummy	0.004	0.002	0.015**	-0.005
Demographic Variables				
% Scheduled Caste Population	0.006	-0.007	-0.005	-0.001
% Scheduled Tribe Population	-0.089**	-0.072***	0.031	-0.0022
	(-2.36)	(-2.80)	(.66)	(-0.15)
% Muslim Population	-0.599	-0.073	0.015	-0.029***
Geographic Variables				
Log Rainfall	.072***	.057***	0.013	0.0005
	(3.64)	(3.51)	(.86)	(.11)
Coastal Dummy	0.011	0.0083	-0.0007	0.006
% of reported area covered by Forests	-0.059	-0.049	-0.023	-0.007
Number of Observations	457	457	457	457
R-Squared	0.54	0.52	0.32	0.23
State Dummy Variables	Yes	Yes	Yes	Yes
Clustered Standard Errors	NSS Region	NSS Region	NSS Region	NSS Region
No. of clusters	74	74	74	74

Notes: ***Significant at 1% level, **Significant at 5% level, *Significant at 10% level. Constant term is suppressed. T-Stats reported in parentheses under coefficients of selected variables. NSS regions are broadly based on agro-climatic conditions. Sex ratio is females per 1,000 males. RemHH is % of households (HH) receiving remittances at the district level, RemHHcl is the lower bound estimate of RemHH, SSMigHH is the % of HH reporting seasonal out migration and NRemHH is the % of HH reporting out-migrants for economic reasons and not receiving remittances.

1901. The coefficients again convey that RemHH is higher for those districts with higher sex ratios in 1901, after controlling for observable factors.

Rows 3 to 12 show empirical results of running the baseline regression specification replacing the Sex Ratio 1901 variable with the Sex Ratios in subsequent Census years. These regressions are run on the sample of districts used in the baseline regression with Sex Ratio 1901 as the persistence variable, to ensure comparability. We find that the coefficients consistently increase with each Census year (1951 being a minor exception) as do the R-squares of the regressions. This is to be expected as RemHH *should* correlate much more with sex ratios in 2001 than in 1901 as all the recent migration trends will be picked up by the Sex Ratio 2001 variable and not by the Sex Ratio 1901 variable.

Rows 13 to 22 show empirical results of similar regressions but using all the data available for the sex ratios in the Census years. The results are similar to those using the fixed sample, that of strongly positive coefficients on the persistence variables as well as the rise in magnitudes across the century.

Our interpretation of this is that across the 20th century, some new migration streams developed such that by the end of the 20th century, migration streams represented a combination of the new and old streams. Some of the new streams are from parts of Kerala, Uttarakhand, Himachal Pradesh and Rajasthan. But the old migration streams did not die out as seen by the strongly positive coefficient on the Sex Ratio 1901 variable. That is, the old migration streams have persisted even as new migration streams have developed over the course of the 20th century and they have tended to share similar migration characteristics.

4 Labor Market Consequences

4.1 Theoretical Framework

How can male out-migration for work affect labor markets in the source regions? We consider this question at the household level and at the broader regional level that comprises of households directly affected by migration as well as households indirectly affected by migration.

Male out-migration induces a change in the composition of the household, and remittances affect the disposable incomes and work-leisure choices of the household members. The first effect is that in nuclear families in patriarchal societies, the incidence of female-headed households rises (Murray, 1981; O'Laughlin, 1998). Using NSS 2007-08 data, we estimate that the percentage of households headed by males falls from about 90% in non-remittance receiving households to 60% in remittance-receiving households in both rural and urban areas. This figure is not lower than 60% because older males or fathers of out-migrants continue to be the household heads in non-nuclear remittance-receiving households. Further, among all females within a household, the proportion of those who are considered as 'spouses of heads' declines from nearly 40% to about 20% in both rural and urban areas. This compositional shift can alter the degree of female autonomy and increase women's access to a number of roles that were previously reserved for men, especially in nuclear families (Dandekar, 1986; Jetley, 1987; Gulati, 1993; Paris *et al.*, 2005; Datta & Mishra, 2011). It could also lead to greater female participation in the workforce (Desai & Banerji, 2008; Raphael, 2013). On the other hand, migrants' remittances ease the households' budget constraint and constitute an 'income' effect whereby prospective workers may be discouraged to work themselves. This is all the more pertinent in India where studies have documented a negative association between household incomes and women's participation in the labor force (Himanshu, 2011; Abraham, 2013). Thus, *a priori*, the impact of male out-migration on women's participation in the workforce is not very clear. The 'income' effect can also potentially influence work choices of other members of the households. Children and teenagers may continue their schooling longer than usual (Mueller

Table 4: Regression Results using different 'persistence' variables

Row No.	Persistence Variable	Coefficient	T-Stat	Obs	R.Sq
1	**Sex Ratio 1901**	0.00049***	3.90	457	0.54
2	**Sex Ratio 1901 Dummy Variables**			457	0.55
	Sex Ratio 1901, Less than 900 (Base Category)				
	Sex Ratio 1901, Between 900 & 950	0.050***	3.34		
	Sex Ratio 1901, Between 950 & 1000	0.076***	3.27		
	Sex Ratio 1901, Between 1000 & 1050	0.094***	4.18		
	Sex Ratio 1901, Between 1050 & 1100	0.097***	3.22		
	Sex Ratio 1901, Above 1100	0.151***	4.46		
	Fixed Sample				
3	Sex Ratio 1911	0.00048***	3.90	457	0.54
4	Sex Ratio 1921	0.00049***	4.78	457	0.55
5	Sex Ratio 1931	0.00054***	5.58	457	0.56
6	Sex Ratio 1941	0.00057***	5.20	457	0.56
7	Sex Ratio 1951	0.00056***	3.66	455	0.57
8	Sex Ratio 1961	0.00059***	3.43	457	0.59
9	Sex Ratio 1971	0.00073***	4.65	457	0.6
10	Sex Ratio 1981	0.00084***	4.83	436	0.62
11	Sex Ratio 1991	0.00099***	5.20	457	0.62
12	Sex Ratio 2001	0.00103***	5.13	457	0.62
	Full Sample				
13	Sex Ratio 1911	0.00044***	3.64	483	0.55
14	Sex Ratio 1921	0.00045***	4.47	483	0.56
15	Sex Ratio 1931	0.00049***	5.01	481	0.56
16	Sex Ratio 1941	0.00054***	4.99	482	0.57
17	Sex Ratio 1951	0.00055***	3.71	504	0.58
18	Sex Ratio 1961	0.00055***	3.49	520	0.59
19	Sex Ratio 1971	0.00071***	4.94	520	0.61
20	Sex Ratio 1981	0.00077***	4.73	498	0.62
21	Sex Ratio 1991	0.00092***	5.17	528	0.62
22	Sex Ratio 2001	0.00094***	5.00	528	0.62

Notes: ***Significant at 1% level, **Significant at 5% level, *Significant at 10% level. Each row number shows a unique regression of the specification form of Column 3 in Table 2 where RemHH is the dependent variable. For example, Row 3 is a regression of the form Column 3 in Table 2 where Sex Ratio 1901 is replaced by Sex Ratio 1911. Fixed sample refers to regression with only those observations available for the 1901 sex ratio data. Data for Assam is not available for 1981.

& Shariff, 2009) and hence drop out from the labor force. All these effects apply primarily to households with out-migrants.

However, male out-migration not only affects the households involved in the migration streams but also other households of the region in which these migration take place. The absence of male workers, especially in the agricultural sector, can induce a greater degree of feminization in the local labor force (Vepa, 2005). Table 1 had suggested higher levels of remittance-based migrations from cultivating households and the absence of the male members could lead to greater feminization of the cultivating workforce in the Indian context.

The injection of remittances in the local economy raises demand for better housing and consumer durables which may raise the demand for construction work and more broadly work in the non-farm economy. Migration networks can alleviate credit constraints for micro-enterprises (Woodruff & Zenteno, 2007) and return migration can lead to more entrepreneurial activity, especially in the services sector (Dustmann & Kirchkamp, 2002). This can include small shops, transport activities, repairs and maintenance works among various other possibilities. To the extent that labor-intensive manufacturing activities require young adults, the reduction of the 15-39 age group male workforce may discourage manufacturing activities in the source regions. Thus, we may expect a diversification of activities towards the non-farm services sector in rural remittance economies. When the migrations are sex-selective, an additional concern is whether this diversification occurs for both sexes or privileges one over another. That is gendered migration could in turn lead to a gendering of labor markets in the source region.

A reduction in the supply of male workers is also likely to tighten labor markets and place an upward pressure on local wages and prices. For instance, Mishra (2007) finds a significant upward pressure on wages in Mexico due to mass out-migration to the United States and Dustmann *et al.* (2012) find the same for Poland due to mass emigration. Rodgers & Rodgers (2011) argue that out-migration, above all factors, was responsible for the steep rise in real wages in their study villages in Bihar between 1999 and 2009.[26] Table 5 compares the rural male laborer wages between selected districts in India sharing a common border but having substantially differing out-migration and remittance-receiving propensities.[27] It shows that districts with higher rates of out-migration appear to have significantly higher laborer wages providing some suggestive evidence of the hypothesis, which we formally test in the next section.

4.2 Methodology and Data

We run cross-section Ordinary Least Squares (OLS) regressions at the individual and district levels, of the following form,

$$y_i = constant + \beta RemHH_i + \sum_{k=1}^{m} \delta_k \Gamma_{ki} + \epsilon_i \tag{2}$$

where y_i is a labor market variable, $RemHH_i$ is an indicator of sex-selective out-migration, Γ_{ki} represents the 'k^{th}' control variable out of a total of *'m'* control variables, and ϵ_i is the error term. The key coefficient of interest is β. This paper focuses only on rural areas as the bulk of

[26]The rise in wages also pushes up labor costs for labor-hiring households and does not uniformly benefit all households in source regions.

[27]The low sex ratios for Haryana are due to sex selective abortion and sex differentials in childhood mortality. However, migration continues to have a notable impact on inflating the sex ratio of Mahendragarh relative to Bhiwani.

Table 5: Missing Men and Wages in Selected District Pairs

State	Districts	Rural Sex Ratio,15-39 age	% of Households Receiving Remittances	Rural Male Casual Labor Daily Wages (Rs.)		% Difference in Wages from Base
Karnataka	Udupi	1262	30	142		54
Karnataka	Dakshina Kannada	1088	20	123		33
Karnataka	Kodagu	1056	8	92	Base	0
Maharasthra	Ratnagiri	1262	37	87		47
Maharasthra	Kolhapur	970	4	59	Base	0
Haryana	Mahendragarh	954	22	113		13
Haryana	Bhiwani	873	10	100	Base	0
Tamil Nadu	Sivaganga	1115	30	100		14
Tamil Nadu	Madurai	1012	9	88	Base	0

Notes: District pairs share common border. Casual laborers are those aged 15-59 working in non-public works. Source: Sex Ratio data from Census 2001, C-14 and refer to females per 1,000 males. Remittances and wages data are authors estimates based on 2007-08 NSS data, with sampling weights.

out-migrations occur from those regions and also to minimize the impact of high-skilled emigration from urban areas that is not adequately captured by the NSS.

For the district level analysis, $RemHH_i$ is the percentage of households receiving remittances in district *'i'*. The key dependent variables of interest are the share of female workers in the agricultural sector, sectoral employment shares and sizes and wages. The first two variables are obtained from the recent Census's while the data on wages is estimated from the NSS 2007-08 survey.

Control variables include dummy variables for each State (or Province) to account for State level characteristics that may affect the pattern of migration. There are 35 states and union territories in India. Other control variables are taken into consideration based on the relevant literature. The data on agricultural productivity come from Chand *et al.* (2009). Standard errors in all regressions are clustered at the NSS region level.

In addition to OLS regressions, we also use IV methods to resolve the endogeneity issues related with migration decisions. Studies on Mexico have employed historic migration networks as instruments for current migration to understand the causal impacts of migration (Hildebrandt & McKenzie, 2005; Woodruff & Zenteno, 2007; McKenzie & Rapoport, 2010). The variable used as the instrument in those studies is the state migration rate to the US in 1924 which was influenced by the development of railroads and demand conditions in the US in the early 20th century. Similarly in this paper, we employ historic migration networks as instruments for current migration in the Indian context.

We use the deviation of the aggregate sex ratio in 1901 from its regional average as an index of out-migration with higher values reflecting higher (male) out-migration. This adjusted measure of historic sex ratios serves as a strong instrument for current migration. In all the regressions tables, the first-stage F-statistics on the instrument variable are reported and they lie in a range of 49-70. The regressions are therefore unlikely to be affected by instrument errors.

4.3 Results

4.3.1 Out-Migration and Feminization of the Agricultural Workforce

According to the NSS, the female workforce participation rates in rural India in 2007-08 among those aged 25-59 were 39% and 51%, according to the principal and usual (principal+subsidiary) status criteria respectively. There are several limitations of NSS data as compared to data collected from Time Use Surveys, that show much higher rates of female workforce participation rates in India (Hirway & Jose, 2011). Hence, we are cautious in drawing inferences from NSS data at the aggregate level and proceed to examine the relationship between out-migration and female workforce participation rates at a disaggregated level. Apart from controlling for various factors in the regression framework, we consider different types of households and assume that migration status does not systematically cause reporting biases within these sub-samples.

Table 6 shows that rural female workforce participation rates are higher by about 3% in households that receive remittances as compared to households that do not receive remittances, after controlling for a variety of factors.[28] This effect is much larger - about 10% - in households that draw their major source of income from the agricultural sector, either as cultivators or laborers. There appears to be a clear relation between male out-migration and increased female participation in the agricultural workforce (principal status). A more detailed analysis by work-status reveals that this increase is almost entirely in the 'own-account worker' category and not accounted by casual work or waged work (results not shown). In contrast, there is a robust and large withdrawal from the workforce

[28]OLS Regression results are almost identical to those obtained from Probit regressions. Results also do not differ substantially between the principal and usual status work definitions.

in 'other' types of households which depend largely on remittance income. This can be attributed to an income effect. Thus, as documented in the theoretical framework, both effects of a rise and decline in workforce participation are evident across different types of households.

The link between out-migration and feminization of the agricultural workforce can also be analyzed at the district level using Census data. According to the Census 2011 Primary Census Abstract, 37% of the agricultural workforce, 43% of the agricultural laborer workforce and 30% of the cultivating workforce comprised of women workers. We run regressions of the female share of different types of agricultural employment in the year 2011 and 2001 on the out-migration variable and control for various district level factors.[29] Table 7 shows that higher sex-selective out-migration is robustly associated with greater feminization of the agricultural workforce. In 2001, the effect was strong on both the cultivator and laborer classes but in 2011 the effect was strong only among the cultivators. This is likely because of significant reporting biases in 2011 among farming households due to the introduction of the National Rural Employment Guarantee Scheme (NREGS) a few years before the 2011 Census. In both years, however, there is a strong relationship between male out-migration and feminization of the agricultural workforce. A 10% rise in the percentage of households receiving remittances is associated with a rise of approximately 4-6% in the female share of the agricultural workforce according to the IV estimates. The effects are stronger for the 'main cultivator' category that comprises of workers who have worked for more than six months of the reference year. These results provide strong evidence that male out-migration has contributed greatly to the feminization of the agricultural workforce.

4.3.2 Out-Migration and Sectoral Employment Patterns

The sectoral employment patterns discussed in this section refer to the source regions of migration. We first compute district level sectoral shares of the 'main' workforce using Census 2001 Table B-4 data for males and females in rural areas. For each category, we regress the sectoral share of the main workforce on the out-migration variable, state level dummy variables and a variable on district level urbanization.[30] Table 8 shows the empirical results for males and females in rural areas in eight of the thirteen sectors, for which significant results were obtained.[31]

IV estimates show significant differences in sectoral shares of the rural workforce for males. It shows a robust negative association between male cultivators and laborers share in the rural workforce and out-migration (with a larger effect on cultivators), consistent with the descriptive statistics presented in Table 1. As a result of male out-migration primarily from the farm sector, the share of males in the non-farm sectors naturally increases. It is however, interesting to note that the association is strongest with the 'trade' and 'construction' sector, followed by other services sectors. The IV estimate for manufacturing activities is insignificant. To test if this link with the non-farm economy is not driven only because of a simple switch in shares caused due to out-migration from the farm sector, Table 9 reports regression results where the absolute size of the sectoral workforce is taken as the dependent variable and district rural population is taken as an additional control

[29]These include female workforce participation rates, urbanization levels, and the percentage of Muslims, Scheduled Tribes and Scheduled Castes respectively in the district.The correlation between remittance-based migration and female workforce participation rate is small at the aggregate district level because it includes the urban sector and off-setting factors of an income effect with the impact on agricultural households documented earlier. Further there is low association between urbanization and remittance-based migration because we include both internal and international migrations.

[30]We assume that the regional variation in out-migration in 2007-08 was largely the same in 2001, which is highly plausible under conditions of migration persistence (Tumbe, 2012c). Census 2011 data on occupations has not yet been released.

[31]The other five sectors are: Agricultural allied activities (plantation, livestock, etc.), Mining and Quarrying, Manufacturing (Household Industry), Electricity, Gas & Water Supply and Financial Intermediation.

Table 6: Rural Female Workforce Participation (Age 25-59) and Out-migration by Household Type, OLS Regression Results

Independent Variable	**Dependent Variable: Participation in Workforce (Principal Status) = 1**					
Household Receives Remittances=1	0.039**	0.080***	0.097***	-0.003	-0.113***	0.028***
	(0.018)	(0.013)	(0.022)	(0.023)	(0.014)	(0.009)
Household Type	Self-Employed in Non-Agriculture	Self-Employed in Agriculture	Agricultural Labor	Other Labor	Other Types	All Types
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Survey Weights	Yes	Yes	Yes	Yes	Yes	Yes
Number of Clusters	570	574	536	531	573	580
R. Sq.	0.19	0.24	0.30	0.18	0.15	0.24
Number of Observations	11,192	31,580	17,031	8,039	10,724	78,566

Notes: ***Significant at the 1% level, **Significant at the 5% level, *Significant at the 10% level. Standard errors (S.E) are clustered at district level. Control variables are age, age square, dummy variables for social groups (ex-Muslims), Muslim household, marital status, education, education of household head, States and Union Territories, and a variable for total number of unmarried household members. Source: NSS 2007-08 data.

Table 7: Feminization of Agriculture and Out-migration, Regression Results

	Independent Variable: % of Households receiving remittances in rural areas			
Dependent Variable (Female Workers as % of...)	OLS	S.E	IV	S.E
Cultivator Workforce, 2011	0.236	(0.043)***	0.285	(0.114)**
Main Cultivator Workforce, 2011	0.218	(0.047)***	0.354	(0.130)***
Agricultural labor Workforce, 2011	0.075	(0.081)	0.225	(0.193)
Main Agricultural labor Workforce, 2011	0.089	(0.064)	0.315	(0.161)*
Agricultural Workforce, 2011	0.176	(0.057)***	0.370	(0.127)***
Main Agricultural Workforce, 2011	0.184	(0.043)***	0.410	(0.121)***
Cultivator Workforce, 2001	0.258	(0.044)***	0.418	(0.120)***
Main Cultivator Workforce, 2001	0.235	(0.053)***	0.544	(0.175)***
Agricultural labor Workforce, 2001	0.140	(0.113)	0.691	(0.232)***
Main Agricultural labor Workforce, 2001	0.156	(0.078)**	0.733	(0.190)***
Agricultural Workforce, 2001	0.229	(0.066)***	0.619	(0.137)***
Main Agricultural Workforce, 2001	0.228	(0.048)***	0.629	(0.159)***

Notes: ***Significant at the 1% level, **Significant at the 5% level, *Significant at the 10% level. Standard errors (S.E) are clustered at NSS-region level. All regressions include constant, state dummy variables and five control variables (a) Female Worker Participation Rate in relevant year (Main+Marginal Workers) (b) Urbanization % in relevant Census year (c) % of Muslims in district population in 2001 (d) % of Scheduled Caste population in district population in 2001 and (e) % of Scheduled Tribe population in district population in 2001. Number of districts in sample for all regressions is 482. Main workers are those who "worked for the major part of the reference period (i.e. six months or more)." Instrument for out-migration is adjusted sex ratios of 1901 (see paper for discussion). F-statistic on instrument is 65.75 and 60.73 in the first stage regressions for the years 2011 and 2001 respectively. Source: Remittances data are authors estimates based on 2007-08 NSS data, with sampling weights. All other variables are sourced from Primary Census Abstracts of Census 2001 & 2011 and religion data from Census 2001, C-3.

variable. It is clear that higher sex-selective out-migration rates are associated with higher absolute sizes of the male sectoral workforces in the services sector and especially in the construction, trading and transport sectors. The association with manufacturing is insignificant. These empirical results provide evidence of higher levels of construction and services activities in remittance economies that are taken up by males.

The empirical results on female employment patterns are more difficult to interpret. The previous section documented the strong link between sex-selective out-migration and feminization of the agricultural workforce. Therefore we expect that out-migration is associated with a greater share of the agricultural sector in the composition of the total female rural workforce. However, the IV estimates show no significant differences in sectoral shares of the rural workforce for females. One possible explanation is that the net aggregate effect of rising and declining female workforce participation rates across different types of households is muted at the district level.[32]

Combining the results for males and females, there is strong evidence of a sectoral reallocation taking place in remittance economies towards the construction and non-farm services sector, but not towards the manufacturing sector. This reallocation is strongly gendered in nature with males taking up most of the opportunities in the non-farm sector.

[32]Rodgers & Rodgers (2001, p. 1980) document a similar scenario in rural Bihar.

Table 8: Sectoral Workforce Shares and Out-migration, Regression Results

	Independent Variable: % of Households receiving remittances in rural areas			
Dependent Variable (% of Rural Main Workers that are in...)	OLS	S.E	IV	S.E
Cultivation	-0.14	(0.084)*	-0.26	(0.073)
Cultivation, Male	-0.26	(0.073)***	-0.51	(0.218)**
Cultivation, Female	0.10	(0.115)	0.34	(0.355)
Agricultural labor	-0.14	(0.073)*	-0.23	(0.311)
Agricultural labor, Male	-0.13	(0.061)**	-0.29	(0.292)
Agricultural labor, Female	-0.09	(0.113)	0.18	(0.346)
Mfg (Non-HH Industry)	0.05	(0.023)**	0.10	(0.073)
Mfg (Non-HH Industry), Male	0.06	(0.021)***	0.12	(0.075)
Mfg (Non-HH Industry), Female	0.02	(0.030)	0.03	(0.075)
Construction	0.03	(0.011)***	0.07	(0.031)**
Construction, Male	0.05	(0.016)***	0.12	(0.047)**
Construction, Female	0.00	(0.006)	0.03	(0.017)
Wholesale and Retail Trade	0.05	(0.013)***	0.11	(0.042)***
Wholesale and Retail Trade, Male	0.07	(0.014)***	0.15	(0.042)***
Wholesale and Retail Trade, Female	0.01	(0.008)	0.00	(0.023)
Hotels and Restaurants	0.02	(0.005)***	0.05	(0.018)**
Hotels and Restaurants, Male	0.02	(0.006)***	0.04	(0.018)**
Hotels and Restaurants, Female	0.00	(0.000)	0.00	(0.004)
Transport Storage and Communications	0.03	(0.008)***	0.05	(0.021)**
Transport Storage and Communications, Male	0.04	(0.013)***	0.07	(0.028)**
Transport Storage and Communications, Female	0.00	(0.001)	0.01	(0.005)
Public Admin, Defence, Education , Health, etc.	0.06	(0.016)***	0.14	(0.065)**
Public Admin, Defence, Education , Health, etc., Male	0.08	(0.019)***	0.22	(0.089)**
Public Admin, Defence, Education , Health, etc., Female	0.07	(0.047)	0.05	(0.089)

Notes: ***Significant at the 1% level, **Significant at the 5% level, *Significant at the 10% level. Standard errors (S.E) are clustered at NSS-region level. All regressions include constant, state dummy variables and a control for the level of urbanization as per Census 2001. Number of districts in sample for all regressions is 473. Excludes districts with urbanization above 60%. Main workers are those who "worked for the major part of the reference period (i.e. six months or more)." Instrument for out-migration is adjusted sex ratios of 1901 (see paper for discussion). F-statistic on instrument is 64.90 in the first stage regressions. Source: Remittances data are authors estimates based on 2007-08 NSS data, with sampling weights. Workforce figures are from Census 2001, B-4.

4.3.3 Out-Migration and Wages

The data presented in Table 5 had suggested that there could be a positive relationship between rural wages and out-migration in the source region. We now test this relationship formally by controlling for two important factors that are likely to influence the regional variation in rural wages – productivity per worker and distance from major urban centres.[33] The first factor is a variable called 'Average Productivity per Worker in Agriculture' for the year 2003-04 for which data exists for over 90% of Indian districts (Chand *et al.*, 2009). The second factor is a series of dummy variables representing minimum distance from a major metropolitan centre. In addition, state level dummy variables control for price differentials and state specific legislations regarding wages.

Table 10 reports the regression results with log of daily earnings of rural male casual laborers

[33] Jose (2013) observes the wage-productivity link. We can rule out any major impact of NREGS on rural wages in 2007-08 as the scheme had only just come into place in many districts and the initial response was slow. The correlation between agricultural productivity and the out-migration variable is negligible and insignificant, which in itself is an important finding that deserves further research.

Table 9: Sectoral Workforce Sizes and Out-migration, Regression Results

	Independent Variable: % of Households receiving remittances in rural areas			
Dependent Variable: Log (Rural Main Male Workers that are in. . .)	OLS	S.E	IV	S.E
Cultivation	-0.011	(0.003)***	-0.039	(0.019)**
Agricultural labor	-0.017	(0.005)***	-0.035	(0.019)*
Manufacturing (Non Household Industry)	0.006	(0.003)*	0.009	(0.011)
Construction	0.009	(0.004)***	0.021	(0.010)**
Hotels and Restaurants	0.007	(0.005)	0.028	(0.012)**
Wholesale and Retail Trade	0.009	(0.002)***	0.016	(0.007)**
Transport Storage and Communications,	0.008	(0.004)**	0.009	(0.008)
Public Admin, Defence, Education , Health, etc.	0.008	(0.002)***	0.021	(0.006)***

Notes: ***Significant at the 1% level, **Significant at the 5% level, *Significant at the 10% level. Standard errors (S.E) are clustered at NSS-region level. All regressions include constant, state dummy variables, a control for the level of urbanization as per Census 2001 and the log of rural population size. Number of districts in sample for all regressions is around 470, except for 'hotels and restaurants' where it drops to 204. Excludes districts with urbanization above 60%. Main workers are those who "worked for the major part of the reference period (i.e. six months or more)." Instrument for out-migration is adjusted sex ratios of 1901 (see paper for discussion). F-statistic on instrument is 63.13 in the first stage regressions. Source: Remittances data are authors estimates based on 2007-08 NSS data, with sampling weights. Workforce figures are from Census 2001, B-4 and population figures from the Primary Census Abstract.

(age 15-59), as the dependent variable. The OLS estimates, with and without state control variables, show a strong positive relationship between out-migration and rural wages, even after controlling for productivity and distance. The IV estimates are also highly significant with slightly larger coefficients on the out-migration variable than those obtained by OLS. The F-statistic on the instrument is above 50 in first-stage regressions indicating relevancy of the instrument. The coefficients on the out-migration variable suggest that a 1% unit rise in the percentage of households receiving remittances (from say 10% to 11%) is associated with 0.5% to 1.4% higher rural wages. In the preferred IV specification with state control variables, the effect is 1%.

These empirical results raise an important question: Why should there be wage differences when persistent migrations should have discovered certain wage equilibria? One explanation is that in spite of persistent migration, remittance-based out-migration rates in India have doubled in the past two decades (Tumbe, 2011) leading to a *recent* disruption in labor markets that have contributed to the observed wage differences. Another possible explanation is that information about rural wages in other parts of the country are more difficult to discover for prospective migrants than wages in urban areas. This implies that differences in rural wage rates could also be due to incomplete information. More generally though, the empirical results strongly suggest a tightening of rural labor markets due to male out-migration.

Table 10: Wages and Out-migration at the District Level, Regression Results

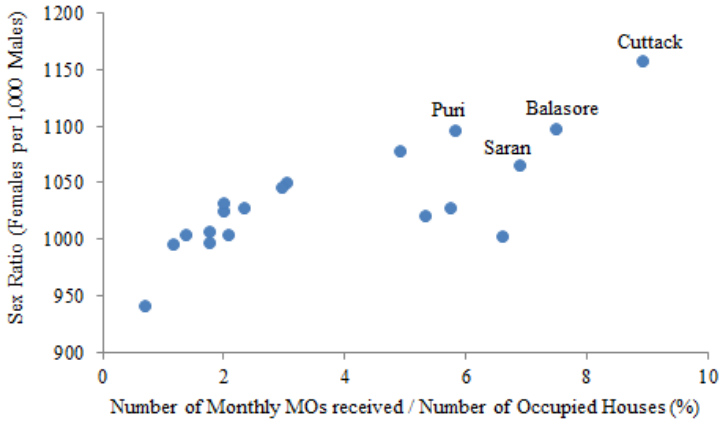
	Dependent Variable: Log (Rural Male laborer Daily Earnings Rs.)			
	(1)		(2)	
	OLS	IV	OLS	IV
% of Households Receiving Remittances in rural areas	0.008***	0.014**	0.005***	0.010**
	(0.003)	(0.006)	(0.001)	(0.004)
Log (Average Productivity per Agricultural Worker)	0.147***	0.154***	0.089***	0.105***
Distance from major metro-cities, Dummy Variable				
Within 100 Km (Base Category)				
Between 100-300 Km	-0.029	-0.043	-0.113**	-0.114**
Between 300-500 Km	-0.121	-0.148	-0.179***	-0.184***
More than 500 Km	-0.204*	-0.226*	-0.225***	-0.248***
State Dummy Variables	No	No	Yes	Yes
Number of Clusters	71	71	71	71
R Sq.	0.23	0.20	0.79	0.77
N (Number of Districts)	457	457	457	457

Notes: ***Significant at the 1% level, **Significant at the 5% level, *Significant at the 10% level. Standard errors are clustered at NSS-region level and reported in parentheses. laborers are those aged 15-59 working in non-public works. Constant term not shown in output. Instrument for out-migration is adjusted sex ratios of 1901 (see paper for discussion). F-statistic on instrument is 55.55 and 49.93 in the first stage regressions of (1) and (2) respectively. Source: Remittances and wages data are authors estimates based on 2007-08 NSS data, with sampling weights. Productivity data from Chand *et al.* (2009). Distances calculated from district headquarters geographical coordinates. Major metro cities are Mumbai, Delhi, Kolkata, Chennai, Hyderabad, Bangalore, Ahmedabad and Pune.

5 Conclusion

Migration has been consistently overlooked in the large body of research work on Indian labor markets and the literature on Indian economic history under assumptions of 'low' spatial mobility. This paper has shown the high and rising magnitude of contemporary out-migration, the remarkable persistence of remittance-based migrations for more than a century and its consequences on rural labor markets in the early twenty-first century. While we have discussed remittances only in the contemporary era, it is worth pointing out the significance of remittances in the past as well. Figure 5 shows the clear positive relationship between male out-migration and remittance receiving intensities at the district level in Bihar in the early twentieth century.

Figure 5: Postal Money Order Remittance Inflows and Out-migration in Bihar & Orissa, c. 1915



Source: Census of India, Vol. VII, Bihar and Orissa, Part 1, 1921, pp. 107 for data on Money Orders (MOs) and Part 2 for information on population and occupied houses. Notes: Monthly MOs refer to average number of monthly MOs paid in the district between years 1915-1920. Sex ratios used as proxies for male dominated outmigration.

Male out-migration and the accompanying remittance flows are closely associated with feminization of the agricultural workforce, diversification into the non-farm services sector for males and higher rural wages due to tighter labor markets. The paper thus contributes to the growing literature on the economic impacts of migration on the source region and brings out the importance of gendered labor markets. In particular, it shows the gendered sectoral reallocation in rural remittance economies with 'missing men'. Men take up the new opportunities, in construction and trading activities for example, but females continue to be associated with agricultural work.

When these cross-sectional findings are combined with the fact that remittance-based out-migration rates nearly doubled in India between 1993 and 2007-08 (Tumbe, 2011)[34], it is quite likely that over the past two decades, male out-migration was an important source of agricultural workforce feminization, higher growth rates in the non-farm services sector, especially construction, and higher growth rates in rural wages in specific regions. These features of the labor market have been widely commented upon before but migration has rarely been the focus of those discussions. This paper suggests that such omissions can no longer be justified.

Labor markets in the past five years have also been affected by the introduction of the National Rural Employment Guarantee Scheme (NREGS), the largest public intervention in Indian rural

[34]Female mobility has also risen considerably in the past two decades (Mazumdar *et al.*, 2013).

labor markets. However, the self-selecting nature of the policy is likely to affect only relatively poorer households engaged in seasonal migrations, than remittance-based migrations which are positively associated with consumption classes and constitute the major part of work related migrations in India. As a result, the interplay of NREGS and remittance-based migrations will have an important bearing on the evolution of rural labor markets in the near future. For instance, if NREGS has a higher take-up among women workers, it could raise the household income, break the income constraint and encourage the male members to switch from seasonal to longer duration remittance-based migrations. That is, NREGS may reduce certain types of migrations, but also encourage other types of migration due to household diversification strategies.

We conclude by noting that the 'Great Indian Migration Wave', at its core, reflects deeply gendered notions of work and mobility. While this paper has shown that spatial mobility is not low in general, it has been low (for non-marriage related reasons) for women. Thus, gender norms plays an integral role in sustaining male-dominated migration streams and the evolution of remittance economies. Male dominated out-migrations may be an effective household strategy and may even increase female autonomy in many aspects but is likely to deny substantial upward mobility for women in the long run if women are wedded solely to economic activities in the primary sector. If there is any lesson to learn from the consequences of the Great Indian Migration Wave, it is that public policies should not only support migrant workers and their aspirations but also create conditions for more gender-balanced migrations.

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