

The Puzzle of Marriage Migration in India

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Abstract

Two thirds of all Indian women have migrated for marriage, around 300 million women, but little is known about this vast migration. This paper provides a detailed accounting of the puzzlingly large migration of Indian women and evaluates its causes. Contrary to conventional wisdom, marriage migration does not contribute to risk sharing. Nor is it driven by sex ratio imbalances. Instead, I introduce a simple model in which parents must search for a spouse for their daughter geographically. By adding geographical search frictions, the model helps rationalize the large regional differences.

JEL classification: O15; J12; J16

Keywords: Marriage migration; Consumption smoothing; Caste fractionalization; Spousal choice; Geographic distribution of women; Asia; India

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1 Introduction

Each year approximately 20 million women in India move to live with their husband's family on marriage. Marriage migration is by far the largest form of migration in India and is close to universal for women in rural areas. Although there are significant regional differences, most of India practices some form of patrilocal village exogamy in which women are married outside of their natal village, joining their husband's family in his village. Across India three quarters of women older than 21 have left their place of birth, almost all on marriage. Only 15% of Indian men have moved from their place of birth. Women are typically married young, between 16 and 20, and are generally illiterate or have less than a primary school education. Although the distances are not always large, the mean travel time from her natal village is about three and a half hours and can be much larger. Sent to a new village, new brides are often subject to violence, and are forced to create a new life in a strange place only rarely of their own choosing.¹

Marriage migration in India is almost entirely unstudied, despite its vast size and a growing consensus that women play a crucial role in education, health, and economic development (UNICEF, 2007; World Bank, 2012). Part of the reason, as suggested by Lucas (1997), is a lack of good information on rural to rural migration and the focus on rural to urban migration. Since women moving into an area are generally approximately balanced by the women moving out, the net flow is typically very low, even if the gross migration is large. That makes marriage migration easy to miss since there are no expanding urban populations or new slums that signal change.² Malnutrition and poor health are pervasive in India (Mehrotra, 2006) which has some of the worst rates of child malnutrition anywhere (Deaton and Drèze, 2009). Further, there is extensive maltreatment of women and sexual discrimination starting before birth (see, for example, table 1 and Anukriti

¹The statistics in this paragraph are based on the author's calculations from the Indian National Sample Surveys and the India Human Development Survey, see table 1. Also see Bloch and Rao (2002) for the strategic uses of dowry violence.

²To illustrate just how unstudied marriage migration is: in a comprehensive bibliography on migration in India with over 3,000 references from across the social sciences only 28 reference marriage and of those 13 are about transnational or expatriate marriages (Tumbe, 2012). Similarly, when the Census of India compiles tables on migration it considers reasons for migration (table D-3 in 1991). Although the census shows that substantially more than half of all migrants are women on marriage, of the 19 tables on migration in the 1991 census 12 restrict the table to just to those who migrated for employment and two restrict the table to children under 10. No table examines marriage migration separately.

(2013)). In all of these problems the low bargaining power and autonomy of women may play a central role, and so it seems that a good place to start understanding them is with the fact that while most of the men in India live where they were born, few of the women do.

The lack of attention to marriage migration means that very little is known about its extent, geographical distribution, how it has changed over time, and the relationships of age, distance, and geography. The first contribution of this paper is to significantly enhance our understanding of migration in India based on new information from large nationally representative surveys and census information on all of the 600,000 Indian villages.³

Second, this paper shows that the existing explanations of marriage migration are largely irrelevant. The leading approach in the economics literature is that of [Rosenzweig and Stark \(1989\)](#) who suggest that female migration is a strategy to help smooth consumption for agricultural families. Yet I show that transfers between the birth family and marriage family of married daughters and sisters are almost non-existent. If consumption smoothing is an important motive for marriage migration, the frequency of transfers between households must be approximately proportional to the frequency of shocks; an insurance mechanism that never pays out insurance is a poor insurance mechanism. Since there are no transfers, marriage migration can play only a very minor role in consumption smoothing.

It is possible that such transfers are under-reported or that they take some other form than transfers of money or goods, so I examine how marriage migration is related to the volatility of rainfall across districts. Rainfall volatility is an important source of income shocks in an agricultural society ([Jayachandran, 2006](#)) and is potentially geographically diverse so that marrying a daughter far away might help provide insurance. Yet districts with greater rainfall volatility have *lower* marriage migration, exactly the opposite of what would happen if marriage migration were

³A broad description is sorely missing from the small literature which considers marriage migration. That literature largely relies on small surveys in several villages ([Behrman, Birdsall, and Deolalikar, 1995](#); [Dutt, Noble, and Davgun, 1981](#); [Hyde, 1995](#); [Rosenzweig and Stark, 1989](#)) or village ethnographies ([Gould, 1960](#)) and so has difficulty discussing the wider phenomenon. Some analysis using the extremely limited information at the district level in the census from 1971 ([Balakrishnan, 1992](#); [Libbee and Sopher, 1975](#)) has allowed a slightly broader discussion of distance and regional differences. A larger literature considers the small population of transnational marriage migrants from India (see [Palriwala and Uberoi \(2008\)](#)). [Mazumdar, Neetha, and Agnihotri \(2013\)](#) consider female labor migration in India, and reasonably suggest that it is very difficult to consider labor migration and marriage migration separately.

an important source of insurance.

A different approach to explaining marriage migration has been to assume that it is part of a process of equalizing geographically imbalanced sex ratios. Some villages and states have more men than women because of preferences for sons or through random variation. Marriage migration is one way to equalize the geographic distribution. Indeed, one might expect that with the spread of technology allowing sex-selective abortion, the worsening sex ratios in some areas would cause other areas to “specialize” and produce more women.⁴ To test this hypothesis I examine the distribution of women and girls across all of India’s nearly 600,000 villages in 2001. While three quarters of women migrate in rural areas, only 2.7% would need to migrate to completely equalize sex ratios across every village in India. Comparing the geographic distribution that would prevail if no women moved, it seems that marriage migration leaves the gender imbalances across all of Indian villages about what it would be if no women moved. Marriage migration is a distinct and larger phenomenon of which only a minor portion can be explained by the pull factors of imbalanced sex ratios.

So how should we understand marriage migration? Potential spouses are difficult to find and there is an inherent geographic dimension to the search. I introduce a model of the geographic search for spouses in which the area of search is a decision variable, and both caste fractionalization and the size of the local village play a role. Parents searching for spouses for their daughters have to decide whether any given offer is good enough or whether they should keep searching. The model builds on the job search literature and is tractable enough to offer clear predictions, yet rich enough to capture the spatial, temporal, and social dimensions of the the joint marriage and migration decision.

The model yields a number of predictions that help explain the regional variations and extent

⁴The specialization in producing women is the geographic implication of the model introduced by [Edlund \(1999\)](#). In that model hypergamy prompts the poorer or lower caste families to produce more girls. The hypothesis that imbalanced sex ratio leads to high demand and so importing of brides is appealing and describes some marriages. [Kaur \(2004\)](#), for example, examines the phenomenon of long distance marriages to very high male areas. While these long-distance marriages do exist, they are a tiny fraction of marriage migration as shown in table 2. Similarly, ([Fan and Huang, 1998](#)) look at rural to urban marriage migration in China. Women are relatively far more abundant in rural areas due to the large migration of young men for work. A larger literature ([Edlund, Liu, and Liu, 2013](#); [Kawaguchi and Lee, 2012](#)) examines cross-country marriages in Asia where women from relatively poor countries (Vietnam, China) marry men from richer countries (Taiwan, Korea, Japan).

of marriage migration. I briefly examine the predictions by comparing across broad regions and in a series of district level regressions. The model suggests that a central driver of marriage migration is the value placed on unmarried women, further supporting the the close connection between female autonomy and development suggest by [Dyson and Moore \(1983\)](#). If parents view having an unmarried daughter as a disaster, they will search hard to marry her off, covering a wider area, and will accept lower quality matches. That means she is more likely to migrate, will move farther on average when she does migrate, will be married younger, and will tend to have a lower quality spouse. And indeed, in the districts where women have lower literacy rates, marriage migration is higher, travel times on migration are longer, women marry younger, and are more likely to be subjected to violence in marriage.

Other difference across India in marriage practices also fit well with the model predictions. Stronger caste or religious fragmentation means the endogamous groups are smaller and so there are fewer options. The model suggests, however, that if the fragmentation is the same within villages as outside them, such caste fragmentation has a neutral effect on marriage migration except that it makes search more costly. Using a measure of caste and religious fragmentation from [Banerjee and Somanathan \(2007\)](#) based on the 1931 census, I find that as the model predicts caste fragmentation has a small negative relationship with marriage migration. One way to make such fragmentation less costly is to accept a closer degree of familial relationship between spouses. That acceptance is increasing with caste fragmentation across districts. And exactly as the model predicts, in districts that are more accepting of marriage between related spouses, fewer women migrate, they move less far, they marry older, and they are treated better within marriage.

This paper intersects with a growing literature that examines the marriage market in India. That literature has largely ignored the inherent geographic component of marriage; instead the focus has been on whether dowries help the market clear and whether they have been increasing. A series of papers ([Anderson, 2003, 2007](#); [Rao, 1993](#)) have examined whether what appears to have been an increased in dowries can be explained by population growth and the caste system, although [Edlund \(2006\)](#) suggests that the rise in dowries is an artifact of imprecise definitions, particularly the inability to differentiate dowry as a negative bride price from dowry as a form of early bequest.

[Sautmann \(2011\)](#) introduces search frictions in the marriage market and shows that with frictions rising populations can explain both a narrowing age gap and higher dowries. Other work examines the marriage market more generally: [Bloch, Rao, and Desai \(2004\)](#) focus on wedding expenses, usually borne by the bride's family, as a form of conspicuous consumption. Examining the middle-class which advertises in newspapers to help find spouses, [Banerjee et al. \(2009\)](#) suggest that the marriage market clears efficiently and is relatively homogeneous along caste lines. Migration, marriage, and cultural practices interact in complex ways.

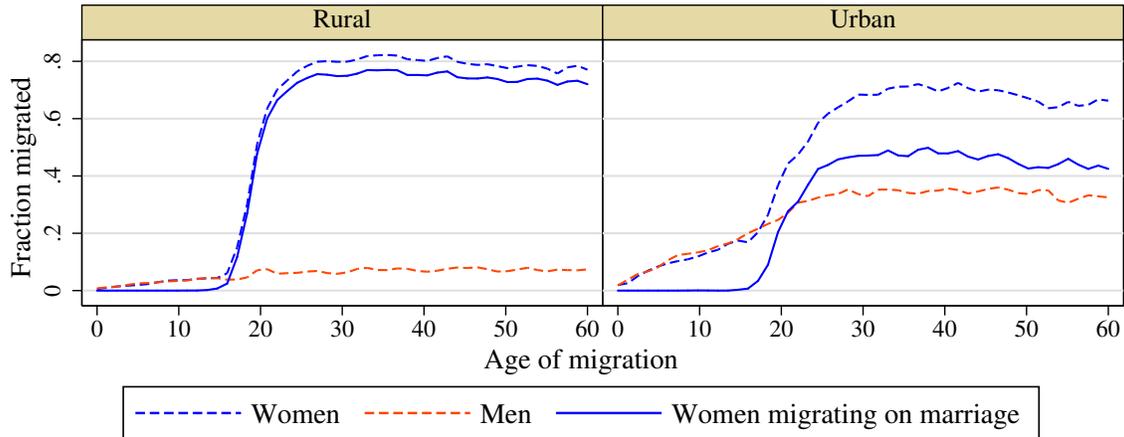
In examining the puzzle of marriage migration this paper first provides new evidence on its geographic extent, on how far women move, and on how it has changed over time. I then move on to consider what might be explaining marriage migration. Section 3 examines whether we can explain marriage migration from sex ratio imbalances. In section 4, I consider and firmly reject the consumption smoothing hypothesis. Section 5 introduces a geographic search model and provides evidence that the model helps explain the regional differences. Yet much is still unknown about the vast and largely unnoticed movement of women in India.

2 Who is migrating for marriage, where, when, and how far?

Until age 16 male and female migration is nearly identical and driven by family movements. After that, in both rural and urban areas female migration increases rapidly as women marry and move to their husband's family. Migration by age is shown in figure 1 for rural and urban areas (the sector is defined as where the migrant lives). The fraction who have migrated stabilizes for women in rural areas after approximately age 21 when most marriages have occurred, with 74% of all women in rural areas having migrated for marriage (79% have migrated for any reason). While the rate of migration is lower for women living in urban areas, overall 66% of women over 21 have migrated for marriage. Table 1 shows some summary statistics on marriage migration and women in India. About 72% of women over 21 still live in rural areas in India.

Marriage migration varies substantially across the country. Figure 2 shows both the extent of marriage migration and the distance of migration across Indian districts. In the large populous

Figure 1: Migration by age and sex



Notes: Shows the age and migration status for men and women by sector. The sector is defined by the place of residence as of the survey. Weighted to be nationally representative by sector. Survey data from the 64th round of the NSS.

northern states marriage migration is nearly universal in rural areas. It is over 95% in several of the the northern states, while it is lower, averaging around 60% in the south, and is much lower in the north-east. Across the north there is little variation even within states. Since marriage customs vary so much by region and between urban and rural, I generally show statistics separately for both for the large northern states along the Indo-Gangetic plain and the rest of India. That division follows a long tradition of going back at least to [Dyson and Moore \(1983\)](#), although it is clear from [figure 2](#) that in general migration practices change only gradually between regions.

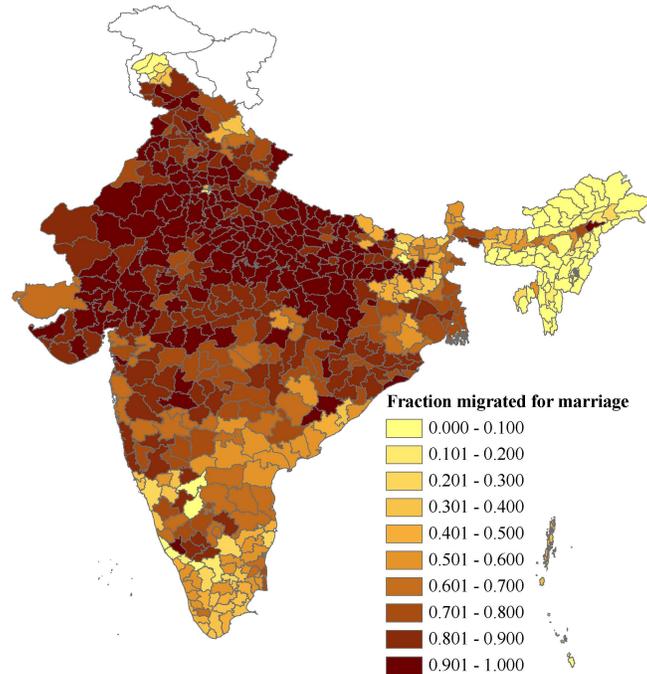
While the migration distance is not always large, when married two thirds of women moved more than an hour away from their birth homes in both urban and rural areas. The India Human Development Survey (IHDS from [Desai, Vanneman, and National Council of Applied Economic Research \(2008\)](#)) asks ever married women the travel time to their natal home when they married. Although it might also be useful to know the physical distance traveled, the travel time is more comparable than physical distance across India and over time since it captures something closer to social distance. [Figure 3](#) shows the distribution of travel times for rural areas. In the rural areas of the large northern states women move much farther on average. Three quarters move more than one hour away in the the rural north compared to only 60% across the rest of the country.

Table 1: Marriage migration, female autonomy, and marriage customs

	All India	Northern states		Rest of India	
		Rural	Urban	Rural	Urban
Fraction women over 21 in each region	1.00	0.29	0.07	0.43	0.21
Fraction women migrate	0.75	0.88	0.78	0.68	0.58
Fraction women migrate for marriage	0.66	0.83	0.68	0.62	0.39
Fraction men migrate	0.15	0.05	0.29	0.10	0.37
Fraction women over 21 illiterate	0.57	0.71	0.43	0.56	0.27
Fraction women migrate illiterate	0.52	0.71	0.39	0.54	0.27
Fraction do any non-domestic work	0.30	0.34	0.14	0.36	0.18
Fraction with any work outside home	0.07	0.07	0.05	0.07	0.09
Hours to natal home on marriage	3.42	3.48	4.81	2.91	3.87
Cannot visit natal home and return same day	0.41	0.49	0.34	0.45	0.38
Age at marriage	17.3	16.1	18.1	17.4	18.9
Age at gauna	17.7	17.1	18.4	17.6	18.9
Who chose your husband?					
Respondent herself	0.05	0.02	0.03	0.07	0.06
Respondent and parents	0.34	0.22	0.30	0.38	0.43
Parents alone	0.60	0.75	0.66	0.54	0.50
How long had you known your husband before you married him?					
On wedding/gauna day	0.68	0.87	0.85	0.59	0.54
Less than a month	0.09	0.03	0.04	0.13	0.14
Less than a year	0.11	0.04	0.03	0.13	0.18
More than a year	0.04	0.03	0.04	0.04	0.06
Since childhood	0.08	0.03	0.05	0.11	0.08
In your community (jati) do people:					
Marry a daughter in her natal village?	0.48	0.30	0.48	0.56	0.57
Marry a daughter to her cousin?	0.38	0.16	0.25	0.49	0.47
Do you need permission to visit the health center?					
Yes	0.73	0.83	0.76	0.73	0.61
If yes, can you go alone?	0.66	0.44	0.66	0.74	0.83
Do you need permission to visit the home of relatives or friends in the neighborhood?					
Yes	0.73	0.79	0.73	0.72	0.69
If yes, can you go alone?	0.69	0.53	0.67	0.74	0.79
In your <i>community</i> is it usual for husbands to beat their wives if:					
She goes out without telling him?	0.39	0.50	0.32	0.38	0.29
Her natal family does not give expected gifts?	0.29	0.34	0.26	0.29	0.22
She neglects the house or children?	0.35	0.37	0.26	0.37	0.29
She doesn't cook food properly?	0.29	0.34	0.21	0.31	0.23

Notes: The first eight rows are from the NSS 64 employment/unemployment survey. The rest of the table is calculated from the IHDS. All calculations are survey weighted. The large northern states are: Punjab, Uttaranchal, Haryana, Rajasthan, Uttar Pradesh, Bihar, Jharkhand, Orissa, Chhattisgarh, Madhya Pradesh, and Gujarat.

Figure 2: Marriage migration frequency across India



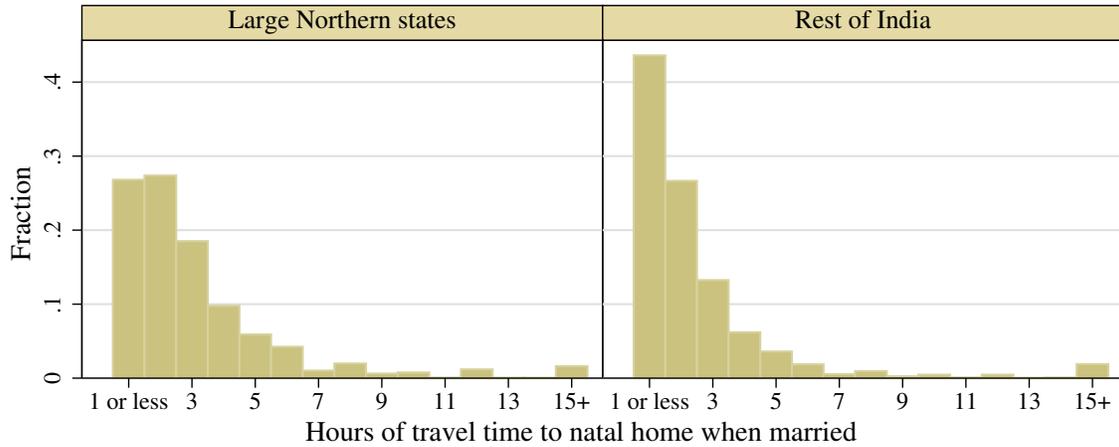
Notes: Shows the fraction of women in rural areas over age 21 who have migrated for marriage by districts (2001 census districts) from the NSS 64th round (employment/unemployment) in 2007-2007.

The geographic distribution across India of travel times is shown in figure 4. While the IHDS is nationally representative, it does not sample in every district, and the sample size in any given district is not necessarily large. It is still clear that travel times are typically longer across the north, but show much variation even within regions.

Not all women move far, but the majority are moving far enough to restrict social contact and communication with their birth families. As can be seen in table 1, 49% of women in rural areas in the large northern states report no member of their family lives close enough that they could visit and come home in the same day while 35% report having no close relative in the rural areas of other states. In Rajasthan, for example, women sing songs about their isolation from their birth families (Hyde, 1995).

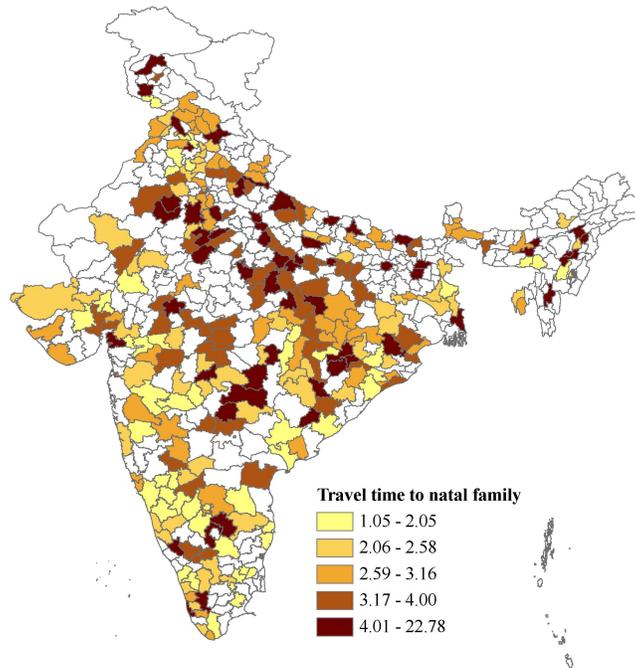
The extent of marriage migration does not appear to have changed much over time. Since figure 1 is a cross-section from 2007-2008, it can also examine the past since older women married longer ago. The extent of marriage migration has been approximately stable across India for the

Figure 3: Distribution of marriage migration time in rural areas



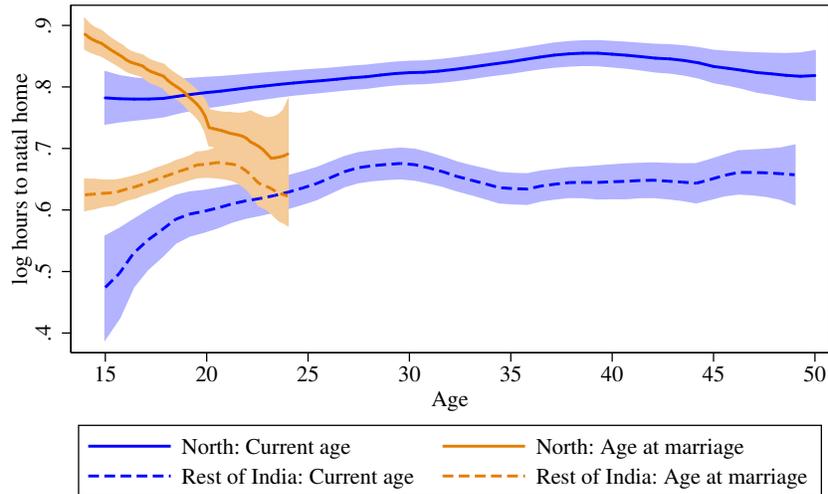
Notes: Shows the distribution of travel time in hours from the birth family of rural women when they marry. The survey records less than one hour as one so those who stay in their natal village are included as moving one or less. The large northern states are: Punjab, Uttaranchal, Haryana, Rajasthan, Uttar Pradesh, Bihar, Jharkhand, Orissa, Chhattisgarh, Madhya Pradesh, and Gujarat. The histogram uses survey weights to be nationally representative by sector. Survey data from the IHDS.

Figure 4: Marriage migration travel time across India



Notes: Shows how far measured by the number of hours to natal home on marriage, women move on migration from the IHDS in 2005. Blank districts were not included in the IHDS.

Figure 5: Age and marriage migration distance in rural areas



Notes: Shows relationship between age and travel time in hours from the birth family of rural women when they marry. Age is either current age from the survey or the age of marriage. Smoothed using a local polynomial with shaded areas representing 95% confidence intervals. Survey data from the IHDS in 2005. The large Northern states are: Punjab, Uttaranchal, Haryana, Rajasthan, Uttar Pradesh, Bihar, Jharkhand, Orissa, Chhattisgarh, Madhya Pradesh, and Gujarat.

last 40 years. Older women seem to have migrated slightly less frequently than younger women, but that may be driven by differential survival—life-expectancy is longer outside of the north where marriage migration is also somewhat less common—or by recall bias.

Women appear to be marrying closer to their natal home in the sense of fewer hours of travel recently. Figure 5 shows how travel time and age are related in rural areas, I describe but do not show the same figure for urban areas. The figure shows two different types of age information: the age of the woman as of the survey in 2005, and the age when she married. Since nearly all marriage is completed by approximately age 22, after that the current age shows how long women in the past had to travel on average.⁵

Marriage distance has been stable until recently for both rural and urban women. Older urban women report slightly longer travel times. In urban areas younger women tend to move closer

⁵In India there is often a distinction between the marriage ceremony, which may be arranged and performed even when the girl is quite young, and *gauna* when the woman moves to join her husband and consummate the marriage. That distinction is particularly important in the northern states where the average age of marriage is almost a year younger than the age of *gauna* as shown in table 1. Throughout I refer to the age of *gauna* as the marriage age for migration purposes since that generally refers to the actual age of migration. The practice seems to be declining as the age of marriage increases.

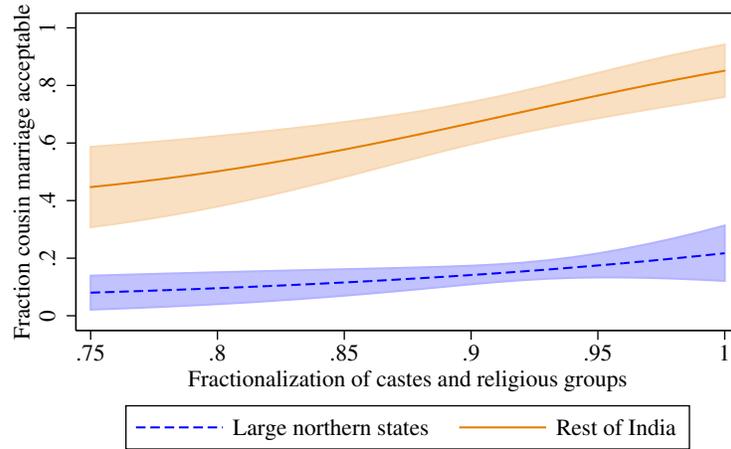
to their natal family. Figure 5 shows that in the rural north, the age of marriage has a profound effect on distance: younger women marry much farther away. In the rest of India distance seems approximately constant with age

Travel times for marriage appear to have decreased recently. The younger women in 2005 who are married by 16 or 17 are moving less far than older women moved on average. That is true even though younger women overall typically move farther. That suggests that the travel time has decreased rapidly recently. Younger women who used to travel the furthest are moving much shorter distances than the average distance for older women. One reason for the change could be improved transportation infrastructure that has decreased travel times, but it is also possible that there are recent social changes affecting marriage distance. Allowing the curves to differ for older and younger women, it does not seem that there are substantial differences in the age-distance relationship although there has been a slight fall in the north. Instead it seems that the increase in the age of marriage has left more women moving slightly shorter distances and changed the mix of who marries very young.

Marriage migration is part of a larger phenomenon of low female autonomy in India. Table 1 summarizes some of these relationships. Since marriage migration is so universal in rural areas, the women who migrate look much like the average woman in rural India: they are mostly poorly educated and have low autonomy. Despite the rapid gains in educating girls recently (Fulford, 2013b), women over 21 in India are still more likely to be illiterate than have any education at all. They are unlikely to have any say in who they marry: 60% report that the choice of spouse was their parents' decision alone across all India, and 75% had no input in the rural north. Most women met their husband on the day of marriage or *gauna*. Women outside of the northern states are more likely to be consulted in the choice of spouse, and to have met their husband before the marriage. Yet even in urban areas most women met their husband on the day of marriage. The practice of arranging marriages does not mean that parents do not have their daughters' best interests in mind, but it does indicate how little power young women have over their lives.

Many of the marriage decisions are closely linked to cultural beliefs about marrying within the village and whether marriages between blood relations are acceptable. It is important not to

Figure 6: Caste fractionalization and consanguineous marriage



Notes: Shows the best fit from a fractional response regression (Papke and Wooldridge, 1996), see footnote 7. The fractionalization index is from Banerjee and Somanathan (2007) created from the 1931 census. Cousin marriage from the IHDS. See figure 5 for the list of northern states.

necessarily treat these practices as exogenous, however, since many of these practices affect each other. Castes, religions and tribes are partly defined by their endogamy (Dumont, 1970, Ch. 5), for example, but changes in these groupings affect other marriage decisions. Figure 6 shows the relationship between caste fractionalization and cousin marriage at the district level based on an index of caste fractionalization from the 1931 census created by Banerjee and Somanathan (2007).⁶ The figure plots the predicted responses from a fractional response regression that accounts for the 0-1 bounds of the fraction and allows the relationship to be non-linear.⁷ Consanguineous marriages become more common as caste fractionalization increases in both the north and the rest of India. One reason marriage migration is lower outside of the north is that consanguineous marriages are much more accepted there.

Women lack autonomy within marriage as well and their lives are often controlled through violence. Across India 73% of ever married women report that they need permission to visit the health center or to visit the home of a friend or relative in the neighborhood. Even with permission,

⁶The index for each district is $1 - \sum_i \gamma_i^2$ where γ_i is the share of each endogamous group in the district. So if there is only one group the index is zero, while at the limit it approaches 1 for very divided areas.

⁷ The approach used is from (Papke and Wooldridge, 1996). If p_i is the fraction for district i , then I fit $\ln(p_i/(1 - p_i)) = X_i\beta$ under the assumption that the p_i are from the binomial distribution (they are the result of many draws whose outcomes are either migrate or not migrate). X_i includes whether a district is in the north, the fractionalization index, its square and all interactions.

around a third need to be accompanied. Such restrictions are enforced through violence. Across India 39% of women report that it is *usual* for husbands to beat their wives if she goes out without telling him. It is similarly common to use violence if her family does not give the gifts expected on marriage, a phenomenon studied by Bloch and Rao (2002). Reporting that such violence is usual is more likely in the north and in rural areas, but it is common everywhere.

3 Marriage migration and geographically imbalanced gender ratios

Where women and girls live in India is determined by two factors: where they are born and where they move on marriage. Since marriage migration is so pervasive, marriage migration is the primary determinant of sex ratios for adults at the village level since most of the women come from outside it. Since there are substantial differences at the state and district level in gender ratios (Guilmoto and Depledge, 2008), it seems reasonable to suppose that some portion of marriage migration is driven by these imbalances. Areas with low female to male ratios may pull women in as the demand for brides is higher in these areas. This section builds on the work of Fulford (2013a) who argues that one cannot understand the wider social consequences of the decreasing female to male sex ratios among children without understanding marriage migration since marriage migration essentially exports the decisions of parents to the surrounding areas.

There is substantial variation across India in gender imbalances. Table 2 shows the percentage female among the children six and under and women over six across all of the villages India and all states. I present the results as the percentage rather than a gender ratio since examining the spatial variance makes more sense for fractions than for ratios.⁸ Villages are the smallest administrative unit in rural areas. In 2001 there were 593,000 inhabited villages with an average population of 1,250, although villages sizes vary substantially across states. I focus on the 0-6 age groups and over 6 since those are the only age ranges reported at the village level.

Women and girls make up substantially less than half the population in India. The gender

⁸It is straightforward to convert between them: if x is the fraction female, the female to male ratio is $x/(1-x)$. The comparison of the variances is more complicated. Although the male to female ratio is often used in other parts of the world, the Indian literature and census tends to focus on the female deficit rather than male surplus and so typically uses the female to male ratio.

Table 2: Village variance in fraction females under six

State	Female	Female	Village	Must move	Female	Autarchy	Village	Rural female migrants (%)		
	≤6 (%)	>6 (%)	variance female>6	to equalize (%)	migration (%)	variance female>6	variance female> 6	same district	diff. dist. same state	different state
India	48.28	48.67	66.3	2.65	75.0	19.1	17.8	74.6	24.4	1.0
Andhra Pardesh	49.05	49.66	48.8	2.18	67.7	8.9	10.0	84.5	15.0	0.5
Assam	49.16	48.44	72.5	2.90	35.6	15.5	18.4	76.6	23.1	0.3
Bihar	48.56	47.94	37.1	2.04	69.2	11.3	12.0	73.3	26.2	0.5
Chhattisgarh	49.54	50.22	48.9	3.16	89.0	7.9	11.9	80.3	18.7	1.0
Gujrat	47.53	48.79	31.2	2.70	92.6	8.7	9.9	79.8	20.1	0.1
Haryana	45.12	46.66	29.2	2.35	97.1	11.2	8.8	39.9	56.6	3.6
Himachal Pradesh	47.37	50.09	218.9	5.78	88.9	46.0	39.4	86.7	11.4	2.0
Jammu & Kashmir	48.90	47.65	67.5	3.73	57.8	19.1	23.5	88.6	11.4	0.1
Jharkhand	49.31	48.96	76.9	3.13	56.7	16.7	21.4	54.6	44.8	0.7
Karnataka	48.69	49.53	75.4	2.74	70.6	12.3	15.9	76.8	22.5	0.8
Kerala	49.01	51.76	3.0	0.88	62.1	1.9	0.9	79.5	17.7	2.8
Madhya Pradesh	48.44	48.03	55.9	3.16	93.4	16.6	17.2	74.7	24.7	0.6
Maharastra	47.81	49.19	42.4	2.86	87.4	15.7	12.8	75.0	24.7	0.3
Orissa	48.86	49.81	99.3	3.77	83.2	18.5	22.4	84.3	15.5	0.2
Punjab	44.42	47.51	51.9	3.19	91.4	12.0	8.5	58.7	39.1	2.2
Rajasthan	47.76	48.31	56.4	2.75	95.5	16.7	15.5	78.6	20.5	0.9
Tamil Nadu	48.26	50.01	31.2	2.65	49.9	5.1	5.9	70.8	27.9	1.3
Uttar Pradesh	47.94	47.36	45.2	2.55	95.1	20.3	16.8	68.8	30.3	0.9
Uttaranchal	47.85	50.64	182.3	4.31	91.8	68.1	38.3	83.3	14.5	2.2
West Bengal	49.05	48.65	51.6	2.33	80.2	9.4	10.6	79.7	18.5	1.8

Notes: The column labeled Female migration and Rural female migrants are from the NSS 64 in 2007-2008 and are calculated for women 22 and older living in rural areas. All other values are calculated from the 2001 village census. Villages and population are administrative units. The percent move to equalize is the fraction of the female population (age ≤6) that would need to move in order to equalize the geographic distribution of the percent female across all villages. The autarchy variance is the variance if no women migrated and villages had the same variance among women over six as under six. The table excludes some of the smaller states but these are included in the all India calculations.

imbalances vary substantially by state as well. Children in Punjab and Haryana are only 45% female while the percentage is close to 49% in some states mostly in the south and north-east. Within each state and across India there is substantial village level variance as well. In some states the variance is much higher because of smaller village sizes (Himachal Pradesh, Uttaranchal) in other much lower because of large village sizes (Kerala).

Given this geographical variation, I calculate how many girls would need to move eventually to equalize the fraction within their cohort across every village in India. That value helps characterize how diverse the geographic distribution of girls is and how much marriage migration could be driven by geographic variation. If f_i is the fraction of children under six who are female in village i and \bar{f}_I is the population mean across all as the India, then if village i has more girls than average and a total of n_i^C children, a total of $(f_i - \bar{f}_I)n_i^C$ girls would need to migrate to equalize the fraction ignoring the integer constraint. Then adding up the total for each village with more than the mean gives the total girls who would need to migrate across all of India. Villages with less than the mean receive girls and so I exclude them to avoid double counting. The results for all of India and only equalizing within each state are shown in table 2.

Only 2.65% of girls six and under would need to migrate to exactly equalize the fraction of women in their cohort across all states and all villages. The fraction would equalize to the all India mean of 48.28% everywhere, including the extremely masculine Haryana and Punjab. These states, while extreme, are relatively small, and the mean is driven much more by the states of Uttar Pradesh and Bihar which together account for close to a third of the rural population. A similar fraction of girls would have to leave in most states. The village and district level variation within states is broadly similar. The exceptions are Kerala with its very large villages that are all close to the mean and Uttaranchal (now Uttarakhand) and Himachal Pradesh which have very small villages.

Far more women actually move. Table 2 shows the proportion of women 22 and older who have migrated and currently live in rural areas. Almost all women are married by that point and almost 90% of female migration is for marriage. All of the village level variation and all of the state variation could be completely equalized with 28 times fewer migrants or about about 3.5

percent of the actual migration that takes place. While marriage migration may have large impacts on gender ratios, it is not primarily driven by them.

Marriage migration plays hardly any role in equalizing the distribution of women across space. Table 2 shows what the variance across villages would be if no women moved and compare it to the actual variance across villages. The “autarchy” variance is the variance if no migration is possible and so villages draw from the same distribution of the fraction female for adults that they do for children. The calculation assumes that villages are drawing from a binary distribution with an unknown probability of each child being a girl p_i . Villages can have different p_i and will have different realizations of the fraction female from randomness. Bigger villages will be closer to their p_i . Then the autarchy variance is if each village instead of drawing from a binary with p_i for the number of children, then allowing marriage migration to move women around, instead draws from the same distribution for the number of adults. The formula relies on assuming that the size of the village is independent from its preferences for girls, and so may miss some important variation, but given the the limited information from a cross-section in the census is a useful benchmark.⁹

The variance without marriage migration would have been 19.1, with marriage migration it was 17.8. Despite three quarters of women moving, the distribution of women across village India is nearly the same as if none of them moved. That suggests very strongly marriage migration is not primarily about women being drawn into areas where there are fewer of them. That does not mean the sexual imbalance plays no part in marriage migration but that the broader phenomenon is not primarily driven by sexual imbalances. When I perform the same calculation for villages in 1991, marriage migration appears to slightly exacerbate the gender imbalances.

A different way to see that marriage migration and geographical sexual imbalance are largely unrelated is to look at migration across districts and states. Across India, 75% of all the women in rural areas who have migrated came from the same district. Since those who do not migrate also

⁹The calculation is as follows as shown in Fulford (2013a): Let f_i be the observed fraction of girls in village i which is a random variable of n_i^c children draws from a binary with the probability of each child being a girl p_i . Then by the law of total variance and variance of a binary: $Var[f_i] = E[Var[f_i|p_i, n_i^c]] + Var[E[f_i|p_i, n_i^c]] = E[(1 - p_i)p_i/n_i^c] + Var[p_i]$. Then assuming the independence of p_i and n_i^c , $Var[p_i] = (Var[f_i] - \omega_c \bar{p}(1 - \bar{p})) / (1 - \omega_c)$ where $\omega_c = E[1/n_i^c]$. If villages then draw from the same distribution for their adults n_i^A again assuming independence, the autarchy variance is $Var^P[F_i] = \omega_A(\bar{p}(1 - \bar{p}) + Var[p_i])$ where $\omega_A = E[1/n_i^A]$ replaces ω_c .

come from the same district, that means that a large majority of women live in the district they were born in. Another 24% come from the same state, and only 1% move across state lines to live in a rural area. For the more imbalanced states that number is higher, 2.2% in Punjab and 3.3% in Haryana, but these are also relatively smaller states where one would expect more migration across state lines as occurs in Himachal Pradesh and Uttaranchal, for example. Geographic gender imbalances ultimately play only a very minor role in explaining marriage migration.

4 Marriage migration and consumption smoothing

The existing economic explanation for marriage migration is that it helps families smooth consumption. In rural areas agriculture, which provides much of the income, may vary greatly geographically and over time. One year the local yields may be high, the next year low. If yields in one geographic area are not perfectly correlated with yields in another area, then households may be able to smooth consumption better by co-insuring each other. [Rosenzweig and Stark \(1989\)](#) suggest based on evidence from a small panel of households in several villages (the ICRISAT villages) that households create such links through marriage migration of females. Indeed, as shown in [figure 1](#) since males in rural areas hardly ever leave, females are the only way to create such geographically dispersed links. When my family has a good year but my daughter's or sister's family does not, I send them resources, and when they have a good year, they send resources to me. One appealing quality of this explanation is that it leaves the potential for marriage migration to be welfare enhancing for everybody including the women who bare most of the costs since they live in households with lower consumption volatility.

This section examines whether consumption smoothing can help explain marriage migration. First, it examines the extent of transfers between families. Next, it examines whether districts with higher rainfall variance have more migration. In both cases it firmly rejects the link between consumption smoothing and marriage migration.

4.1 Transfers between families

In equilibrium, even if shocks that require movement of resources across households to smooth consumption are uncommon for an individual household, across the population we should see resource flows in approximate proportion to their use for consumption smoothing. To see this observation consider a simple sharing model of family linkages such as in [Townsend \(1994\)](#) in which the only smoothing mechanism is sharing. Two households are joined by marriage and transfer resources to help equalize marginal utility. To make things simple, suppose that they prefer equality (none of the conclusions are dependent on this assumption). Then at any time t the consumption of family A is equal to the consumption of family B which is the average of their incomes $c_t^A = c_t^B = (y_t^A + y_t^B)/2$. Now consider a population mass of such families drawing from the same stationary income distribution. Since there is no saving, the distribution of consumption and transfers is the same across the mass of families as it is over time so we can look at the cross-section to understand the distribution of transfers.

The frequency and size of transfers depends on the distribution of income. Consider if the joint distribution of incomes for each household pair is continuous. Then having equal incomes is a measure zero event and each household is either making or receiving a transfer almost surely. That implies that families with marriage connections are always transferring one way or the other: in the data we should see transfers either in or out from all households connected by marriage all of the time.

Perhaps more realistically, suppose families only initiate transfers if some bad event happens or income is below some threshold. A simple way to express this is to assume that each household has a probability p_L of having such a bad event and households have married their daughters well so the bad events are independent.¹⁰ Then with probability $p_L(1 - p_L)$ the family gets a transfer since then it has a bad shock and the other family does not and so sends resources. The family makes a transfer to the other household with the same probability. The frequency of transfers in

¹⁰If consumption smoothing is an important reason for marriage then the definition of a good marriage is finding a family whose income is uncorrelated with yours. Perhaps even better is one that is negatively correlated, but that seems to be asking too much. Introducing covariance does not affect the conclusions unless the correlation is perfect in which case there are never any transfers, but marriage is also useless for consumption smoothing.

the cross-section is then that $p_L(1 - p_L)$ are transferring out and the same fraction are receiving transfers. The frequency of transfers in or out is in proportion to the frequency of shocks requiring transfers. Indeed, if shocks are infrequent then the frequency of any transfer is approximately $2p_L$. The model is a simple way of understanding a general phenomenon: insurance mechanisms must occasionally make transfers if they are actually providing insurance.

Yet such resources flows almost never take place between households that have a female marriage link. The India Human Development Survey (IHDS) asked a nationally representative survey of more than 41,000 households about transfers sent and received by non-residents from the household. Table 3 shows how these transfers are divided based on the relationship with the household sending or receiving. Across India, only 0.05% of households reported any transfer from or to a married daughter, sister or niece (these numbers are weighted to be nationally representative). Such transfers are so uncommon that it is difficult to say much about them other than they hardly ever take place: of the 41,000 households, only 21 report receiving transfers from a married daughter sister or niece, and only two reported sending such a transfer. The transfers are not going through the the husband either; such transfers are even less common. Perhaps there is some under-reporting of transfers into the households as respondents forget transfers they received. Yet households reported receiving a transfer from a married son, brother, or nephew 26 times as often as from a married daughter, sister, or niece.

Without transfers of some kind, such links cannot help consumption smoothing across households by providing resources directly. Either there are no shocks ($p_L = 0$) and so there is no reason to marry to help smooth, or marriage does not create links which are used for smoothing. In either case, transfers through marriage are not a strategy for consumption smoothing.

It is still possible that transfers from and to married daughters and sisters are under-reported, or that they take the form of absorbing household members or providing services rather than money or goods. It is not obvious why such transfers would be under-reported or be entirely non-pecuniary for female relations while those from and to married sons, brothers and nephews are so much larger and direct. Even transfers to and from single daughters, sisters and nieces are larger and it would seem that any underreporting would have the same effect there. The next section therefore

Table 3: Transfers between households in India

	Any transfer to or		Fraction of household consumption if transfer								
	from a non-resident		Sent by non-resident				Received by non-residents				
	Rural	Urban	Rural	N	Urban	N	Rural	N	Urban	N	
No non-resident transfers	89.73	94.39									
Husband	3.27	1.12	0.49	674	0.64	170	0.33	84	0.48	19	
Wife	0.05	0.25	0.68	9	0.32	16	0.30	6	0.27	27	
Father	0.18	0.46	0.31	39	0.22	57	0.21	7	0.11	21	
Mother	0.04	0.31	0.10	11	0.10	27	0.29	2	0.13	22	
Single male student	1.50	0.98	0.35	25	0.33	7	0.16	359	0.34	147	
Single female student	0.71	0.40	0.20	10	0.03	2	0.15	162	0.19	64	
Married son, brother, nephew	1.97	0.95	0.31	426	0.35	136	0.30	42	0.31	7	
Married daughter, sister, niece	0.05	0.06	0.54	12	0.26	9	0.08	1	0.10	1	
Father/Brother/Son-in-law	0.02	0.06	0.31	8	0.20	5	0.22	1	0.46	2	
Single son, brother, nephew	2.06	0.75	0.33	422	0.39	102	0.27	59	0.29	14	
Single daughter, sister, niece	0.14	0.11	0.17	25	0.53	18	0.23	9	0.15	3	
Other relatives	0.28	0.16	0.37	56	0.37	19	0.19	19	0.72	6	

Notes: The first two columns show the fraction of households that had a transfer either to or from a non-resident husband, wife, or married relative. The categories are exclusive and the Other Relatives category absorbs all other relationships. Rural and Urban are the sector of the household, not the migrant. Household consumption is the consumption of the surveyed household which sent or received money. Survey data from the India Human Development Survey ([Desai, Vanneman, and National Council of Applied Economic Research, 2008](#)). All calculations are survey weighted. N represents the number of households reporting that transfer from a total of 41,554 surveyed households.

approaches marriage migration and consumption smoothing from a different direction by asking if marriage migration is related to rainfall volatility.

4.2 Rainfall variance and marriage migration

One of the most important determinants of income in rural India is rainfall (Jayachandran, 2006) and rainfall volatility has been used by many studies to understand the effects of income shocks (Kochar, 1999; Rose, 1999; Wolpin, 1982). Higher rainfall volatility suggests greater income volatility and so provides a greater incentive to find ways to help smooth income shocks. It is also the prime example of a shock that is geographically correlated and so sending a daughter far away might be a way to mitigate such shocks. If marriage migration is part of a smoothing strategy, then we should expect marriage migration to be higher in areas that face additional rainfall volatility.

To test this hypothesis, I build a district level measure of rainfall volatility by employing the long rainfall series based on weather stations in India and across the world collected in Matsuura and Willmott (2012). These provide a dense (0.5 degree latitude and longitude) spatially interpolated grid estimating rainfall at each grid point for each month from 1900 to 2010. While the rainfall data use a large number of weather stations, they do not provide a good estimate of within-district geographical variability. Instead, I compare the temporal variability for each district in several different ways. First, I construct for each district the root mean squared error (RMSE) for that district from its monthly average by regressing the district rainfall on monthly dummies and summing the square of the errors. This method allows rainfall to be volatile within the year (from the monsoon, for example) and so measures the extent to which rainfall varies from its normal yearly course. Second, I construct the standard deviation of monthly rainfall. Third, I construct the standard deviation of total yearly rainfall.

In districts where rainfall volatility is higher women migrate *less* often and move a shorter distance when they do migrate. Table 4 shows the relationship between the three measures of rainfall volatility and the extent of marriage migration and the hours migrated.¹¹ By each measure

¹¹ Several districts have extreme rainfall variations. I exclude districts with $RMSE > 2$ (2 districts), monthly $SD > 4$ (9 districts) and yearly $SD > 7.5$ (2 districts) and four districts that I could not match with rainfall data (island or small city districts for which there was no simple geographical match even with a fine 0.5 latitude/longitude grid). The two

Table 4: Marriage migration and rainfall variance

	Any transfer to or from a		Fraction of household consumption if transfer								
	non-resident (%)		Sent by non-resident				Received by non-residents				
	Rural	Urban	Rural	N	Urban	N	Rural	N	Urban	N	
No non-resident transfers	89.73	94.39									
Husband	3.27	1.12	0.49	674	0.64	170	0.33	84	0.48	19	
Wife	0.05	0.25	0.68	9	0.32	16	0.30	6	0.27	27	
Father	0.18	0.46	0.31	39	0.22	57	0.21	7	0.11	21	
Mother	0.04	0.31	0.10	11	0.10	27	0.29	2	0.13	22	
Single male student	1.50	0.98	0.35	25	0.33	7	0.16	359	0.34	147	
Single female student	0.71	0.40	0.20	10	0.03	2	0.15	162	0.19	64	
Married son, brother, nephew	1.97	0.95	0.31	426	0.35	136	0.30	42	0.31	7	
Married daughter, sister, niece	0.05	0.06	0.54	12	0.26	9	0.08	1	0.10	1	
Father/Brother/Son-in-law	0.02	0.06	0.31	8	0.20	5	0.22	1	0.46	2	
Single son, brother, nephew	2.06	0.75	0.33	422	0.39	102	0.27	59	0.29	14	
Single daughter, sister, niece	0.14	0.11	0.17	25	0.53	18	0.23	9	0.15	3	
Other relatives	0.28	0.16	0.37	56	0.37	19	0.19	19	0.72	6	

Notes: Each column shows the ordinary least squares relationship at the district level. The Root Mean Squared Error Rainfall is the standard deviation of the the residual from regressing monthly rainfall in each district on month dummies. For each district the standard deviation of monthly rainfall and standard deviation of total yearly rainfall are the standard deviation over time and do not account for normal seasonal variation. Panel (A) uses the 64th round of NSS. Panel (B) uses log hours to natal home on marriage from the IHDS and is limited to the districts in the IHDS (see figure 2). Rainfall source: [Matsuura and Willmott \(2012\)](#).

the fraction of women who migrate is negatively related to rainfall volatility. That is true both within and across states, although unsurprisingly the relationship is much weaker when including state effects: states tend to have both similar rainfall patterns and similar marriage migration so much of the relationship between the two is across states rather than within them. The point estimates are quite large: moving from the 10th to the 90th centile in the RMSE among districts (0.51 to 1.07) decreases the marriage migration rate by 32 percentage points or approximately the difference between the north and rest of India.

The correlation strongly suggests that marriage migration does not come from parents with high income volatility seeking to marry their daughters in other areas to smooth consumption. Instead parents in volatile areas are less likely to marry their daughters outside the village. Those who live in areas with a great deal of income variability have a stronger incentive to seek ways to mitigate it, yet their daughters move less frequently.

The negative relationship is less strong between the migration travel time and rainfall volatility. Districts with higher rainfall volatility do marry their daughters somewhat closer—again the opposite of what one would expect if consumption smoothing were an important factor in marriage migration—but the relationship is not statistically significant and the estimate is not very large. Going from the 10th to the 90th percentile district in RMSE results in about a 7 percentage point fall (log units) in hours moved conditional on migration.

5 A geographic search model of marriage migration

To parents of marriageable daughters “it is a truth universally accepted that a single man in a possession of a good fortune must be in want of a wife” as Jane Austen begins *Pride and Prejudice*. But where to find such eligible bachelors? This section develops a model of that search. The model is very similar to the models in the job search literature with variable effort.¹² The central idea is that parents do not have perfect information about all spouses in the area and so cannot just choose

main outlier districts excluded are East and West Khasi Hills in Meghalaya. Both have marriage migration rates near zero and so tend to strengthen the negative relationship.

¹²For a good introduction see [Cahuc and Zylberberg \(2004, chapter 3\)](#) or [Mortensen \(1986\)](#).

the best one available as many models of spousal sorting assume. Instead, they must actively search for potential spouses, evaluate any potential spouses that they discover, and decide whether any particular spouse is good enough after bargaining compared to what they can do by searching more. Since the search is geographical as well as temporal, they must also decide how widely to search, which then determines whether their daughter is likely to marry within the village and how far she is likely to move. Parents also face limitations that they must marry their daughter within the caste or religion. The model can thus help understand both the frequency of migration and the distance conditional on migration. While the model simplifies many parts of the decision, it makes a number of predictions that are supported by the data. I characterize the model as the parents' decision since that is the most consistent with who actually makes the choice as summarized in table 1, but the model can capture the trade-offs for whoever makes the decisions.

Parents searching over an area a who live in a village with population P find potential spouses at rate $\lambda a + g(P)$. Living in a village generates potential spouses for free at rate $g(P)$ where $g'(P) > 0$, but parents have to decide how widely to search beyond the village. Searching area a costs $c(a)$ where $c(0) = 0$, $c'(a) > 0$, and $c''(a) > 0$ so that search gets more and more costly the further away from home. Searching just a small amount is very cheap $c'(0) = 0$. That ensures that some searching is always optimal which simplifies the analysis by avoiding corner solutions. It is also reasonable given that the spouses generated within the village do not require active search to assume that searching just beyond the village is low cost.

All spouses are not created equal, and not all daughters draw the same quality offers. First, only a fraction f of offers are kept. The rest are discarded out of hand because they are not in the right sub-caste, tribe, or religion. Second, spouses vary in quality according to whatever criteria the parents use to decide what makes a good spouse. On finding a potential spouse parents may bargain over things like dowry and how well their daughter will be treated and u is the outcome for the bride's parents. For a daughter of quality q , potential spouses then have post bargaining qualities u drawn from a known distribution $F(\cdot, q)$. Being married to a spouse of quality u then produces a marriage with discounted utility value $W(u) = \int_0^\infty u e^{-rt} dt = u/r$ where r is the discount rate to the parents.

Parents must decide when to accept a spouse and arrange a marriage. To do this they must weigh the benefits of accepting a given spouse or continuing to search for a better one. Their decision rule is thus characterized by the minimum quality spouse who would cause them to stop searching u^* . When $u \geq u^*$ they stop and otherwise they continue.

Since by definition u^* is the quality that makes parents just indifferent, then $V = W(u^*)$ where V is the discounted expected utility from having an unmarried daughter. It is possible to define V a different way as well. Parents get a possibly negative utility b in each instant from having an unmarried daughter. An unmarried daughter may transition into a married daughter, however, with a marriage of quality drawn from the distribution F truncated at u^* . Putting these pieces together, and a little rearranging results in a standard valuation equation from search theory:

$$rV = \max_{a \geq 0} \left\{ b - c(a) + f(\lambda a + g) \left[\int_{-\infty}^{\infty} \max\{0, W(u) - V\} dF(u) \right] \right\}.$$

The value over the next instant of having an unmarried daughter rV is composed of two parts: the value over the next instant of having an unmarried daughter and searching over area a ; and the probability that a potential spouse will be discovered times the the expected value from the offer which will either result in a marriage or be rejected.

The optimal decision of the parents is then defined by two equations. Using $W(u) = u/r$, then $u^* = rV$ and taking the first order condition of a , the optimal search is given by the (implicit) solution to:

$$u^* = b - c(a^*) + \frac{f}{r}(\lambda a^* + g(P))h(u^*) \quad (1)$$

$$c'(a^*) = \lambda \frac{f}{r} h(u^*) \quad (2)$$

where $h(u^*) = \int_{u^*}^{\infty} (u - u^*) dF(u)$.

With the solution u^* and a^* it is possible to define a number of other important relationships. The probability of marrying outside the village or the fraction of women marrying outside the village if all face the same circumstances is given by the likelihood of receiving an offer inside the

village. Since the distribution of qualities is the same inside the village as outside, any potential spouse is equally likely to be accepted. Then the fraction who do not migrate is:

$$\omega = \frac{g(P)}{\lambda a^* + g(P)}.$$

Note that the fraction f of offers that are acceptable does not appear since it affects both the potential spouses that are within the village and outside the village. If caste fragmentation is the same outside the village as it is inside then it affects marriage migration only through its effects on search.

From the start of searching, the mean length of being unmarried T is given by the inverse of the “hazard” of getting married: $1/T = f(\lambda a^* + g(P))(1 - F(u^*))$ where the first part is the frequency of finding potential spouses and the second is the probability of any spouse being accepted.

Conditional on accepting a spouse not from the village, the search area a^* defines how far away the daughter must migrate. The average distance from the center of a circle of radius r is $2/3r$, so the average distance that a migrating daughter must move, if search is conducted in a circle, is: $d = \frac{2}{3} \left(\frac{a}{\pi}\right)^{1/2}$. The search area of parents directly determines the distance of migration and so for the rest of the discussion I draw no distinction between them. If parents are searching farther than their daughters are marrying farther on average.

5.1 Model implications

With the implicit solution to the parents’ problem, it is possible to define how distance, the quality of the marriage, and the likelihood of having to migrate vary with the parameters of the model, and so understand what drives marriage migration. Table 5 summarizes the relationships which take some work to derive but follow standard comparative statics approaches.

The most important determinant of marriage migration is the value that parents put on having an unmarried daughter (b). This parameter corresponds to the unemployment benefits in the job-search literature. If parents view having an unmarried daughter as acceptable, they will search less broadly, and so find fewer potential non-village spouses. Since the outside option is better, their

Table 5: Changes in model outcomes from a changes in each model parameter

Model parameter		Fraction migrate $1 - \omega$	Search Distance a^*	Time to marriage T	Spouse quality u^*
Value of an unmarried daughter	$b \uparrow$	\downarrow	\downarrow	\uparrow	\uparrow
Fraction of pop. marriagable	$f \downarrow$	\downarrow	\downarrow	\downarrow / \uparrow	\downarrow
Freq. of spouses within village	$g(P) \uparrow$	\downarrow	\downarrow	\downarrow / \uparrow	\uparrow
Village population size	$P \uparrow$	\downarrow	\downarrow	\downarrow / \uparrow	\uparrow

daughters will stay unmarried longer, and have higher quality matches.

The frequency of marriage migration and the distance migrated tend to fall as caste fractionalization increases. Higher caste fractionalization implies that the fraction f of the population that is marriageable is lower. More and stricter caste divisions make searching more costly because they reduce the likelihood of finding a spouse for a given cost. Parents therefore reduce search and so are more likely to marry their daughters within the village. The intuition is that caste fractionalization affects both the population within the village and around the village, reducing the eligible population everywhere and so tends to have a neutral effect on the fraction migrating except in the way it affects parents' search. Caste fractionalization does have negative consequences for match quality. By discarding a large fraction of potentially spouses, many good ones are dropped and the average quality falls.

The frequency of potential spouses from within the village tends to reduce search since these potential spouses show up for free, but increase match quality since there are more potential spouses and so a higher chance of a better quality match. That suggests that areas which accept marriages between relatives will tend to have fewer migrations and migrate shorter distances when they do migrate. These matches may also be of higher quality. Since the frequency of matches showing up within the same villages increases with village size, higher village population has the same implications.

5.2 Understanding marriage migration in India

The model presents a simplified view of a geographical marriage search. This section briefly demonstrates how the model helps interpret the facts about marriage migration and how it differs across India.

The model helps to explain the regional variation between the north and rest of India. As shown in table 1, in the north women are more likely to migrate, move farther when they do migrate, and marry younger than in the rest of India. All three observations are consistent with placing a lower value on having an unmarried daughter. Indeed the northern states do particularly badly in all forms of treatment of women. Women in the the north are less well educated, have more restrictions on their movement and autonomy, and are more likely to be the subject of violence. The model then links the basic regional differences in marriage to the regional differences in the treatment and value of women. To be clear, that does not mean that parents in the north do not care about their daughters; instead they live in an area that places low value on women outside of marriage and one aspect of that is that parents search intensively and so marry their daughters farther away.

So at the regional level the model offers an explanation for the differences in marriage migration. I next examine the predictions more systematically at the district level. Table 6 shows a series of regression across districts examining how the fraction who migrate on marriage, the hours of travel on marriage, the age at marriage, and two measures of marriage quality change with district characteristics that the model predicts should affect the search decision. The basic predictions of the model are summarized in table 6. I examine how these predictions covary with empirical analogs of the model parameters. The fraction of women over 15 who are literate is still low as shown in table 1. Education is likely to be closely correlated with the value that parents put on unmarried daughters, as well as possibly increasing that value directly if more educated daughters are more productive. Caste and religious fractionalization directly reduces the fraction of the population that is marriageable. Bigger villages increase the frequency of good spouses appearing within the village. Similarly, accepting cousin marriages means that a larger fraction of the village is marriageable.

Table 6: Marriage migration regressions

	Frac. migrate marriage	Distance migrate (log)	Age at marriage	Beat if go out no perm.	Need permission visit neigh.	Frac. migrate marriage	Distance migrate (log)	Age at marriage	Beat if go out no perm.	Need permission visit neigh.
Fraction female literate (age>15)	-1.314*** (0.355)	-0.269*** (0.0890)	3.583*** (0.405)	-1.183*** (0.347)	-0.555* (0.328)	-0.760** (0.385)	-0.175* (0.101)	3.458*** (0.462)	-1.047*** (0.394)	-0.676* (0.408)
Caste and religious fractionalization	-0.878 (0.693)	0.197 (0.138)	-1.594** (0.629)	1.243** (0.543)	-0.351 (0.563)	-0.916 (0.701)	0.198 (0.137)	-1.596** (0.629)	1.235** (0.542)	-0.346 (0.563)
log mean village population	-0.331*** (0.0875)	-0.0188 (0.0225)	0.138 (0.102)	-0.0919 (0.0884)	0.0473 (0.0774)	-0.265*** (0.0851)	-0.0102 (0.0228)	0.127 (0.105)	-0.0790 (0.0903)	0.0349 (0.0804)
Fraction say cousin marriage acceptable	-1.228*** (0.176)	-0.234*** (0.0454)	-0.414** (0.206)	0.305 (0.203)	-0.619*** (0.186)	-0.653*** (0.225)	-0.142** (0.0652)	-0.536* (0.299)	0.443* (0.268)	-0.740*** (0.280)
Non-northern state						-0.661*** (0.204)	-0.106* (0.0545)	0.141 (0.250)	-0.158 (0.221)	0.140 (0.258)
Constant	5.465*** (0.968)	0.938*** (0.209)	16.56*** (0.952)	-0.433 (0.758)	1.561** (0.757)	4.865*** (0.981)	0.846*** (0.213)	16.68*** (0.977)	-0.560 (0.789)	1.683** (0.810)
Observations	262	262	262	262	262	262	262	262	262	262
R-squared		0.156	0.332				0.169	0.333		
Estimator	logit	OLS	OLS	logit	logit	logit	OLS	OLS	logit	logit

Notes: For dependent variables measured as proportions I use a logit transformation and the assumption that the dependent variable is from a binomial as suggested by [Papke and Wooldridge \(1996\)](#), see footnote 7. The reported coefficients are *not* the odds ratios which can be obtained by exponentiation. Data from the NSS 64th round employment/unemployment, 2001 Census of India, IHDS, and [Banerjee and Somanathan \(2007\)](#).

The model predicts how outcomes of the search process should change. The fraction who need to migrate and the search distance map directly into their empirical analogs. Parents who search farther marry their daughters farther on average. If the age at which parents start searching is the same, then the average time to marriage (T) is the same as the age of marriage.¹³ Finally, I examine two measures of the quality of marriages. The first is the fraction of women in each district who say that in their community it is usual for husbands to beat their wives if she goes out without telling him. The second is the fraction who say they have to ask permission from their husband or a senior family member to go to the home of relatives or friends in the neighborhood. As reported in table 1 across India 39% say that beatings are usual, while 73% need permission; both are significantly higher in the rural north.

The model has substantial predictive success. Higher female literacy is associated with a large fall in the odds of migration, decreases in the hours of travel on migration, increases in the age of marriage, and improvements in the quality of marriage. Caste and religious fractionalization as measured from the 1931 census is not statistically significant for the fraction migrate and the distance, but tends to reduce the age of marriage and increase the fraction who says it is usual for husbands to beat their wives if she goes out without telling him. One reason for it not having a bigger effect is that the willingness to marry a cousin is increasing with caste fractionalization as shown in figure 6. The willingness to marry cousins reduces the fraction who migrate, reduces the distance on migration, reduces the age of marriage, and reduces the fraction who need permission to go out. The village size goes in the same direction as cousin marriage, but is only significant for the fraction who migrate. That result is largely driven by a few districts, mainly in Kerala, with very large village sizes and low migration. Excluding these districts the effect of village size tends to disappear.

These results hold up within regions as well as across them. The last five columns include an indicator for the rest of India that absorbs the differences between regions although constrains

¹³The practice of separating marriage and *gauna* in the north suggests that the age of the start of search is endogenous. When parents start their search is not directly part of the model, but factors that cause parents to want to marry their daughters faster should also push them to want to start the search earlier, so the direction of effects will be the same even with endogenous start.

the coefficients to be the same within them. Although the estimated coefficients are sometimes reduced, the signs still correspond to the model predictions.

The model suggests that many of these relationships are driven by unobservable preferences so the purpose of these regressions is not to claim a causal relationship, but instead to understand how the conditional means covary. For example, while female literacy is very important, it is a mistake to view these results as showing that female literacy causally reduce marriage migration or violence within marriage. Instead, the model suggests that female literacy is an indicator of the value that parents place on their daughters which is unobservable. Female literacy likely has a direct effect on marriage and these regressions cannot separate the direct effect from the indirect effect of preferences. Nonetheless, the relationships are all consistent with the model of parental search.

6 Conclusion

Around 300 million women in India have migrated for marriage and approximately 20 million more marry and migrate each year. The joint marriage and migration decision is the central event of young women's lives. Yet this paper is the first to provide broad evidence to understand the determinants and extent of marriage migration.

In examining marriage migration this paper first considers and rejects two possible explanations for marriage migration. Marriage migration is not related to consumption smoothing strategies. Nor is it driven by imbalanced geographic sex ratios.

To help explain the regional differences surrounding marriage migration I introduce a geographic search model. The model puts a large part of the explanation for the extent and differences of marriage migration across India on the value parents place on having unmarried daughters. For example, the model helps explain the differences between regions. In the north the value placed on women is lower as judged by the higher rates of violence, lower education, and lower autonomy. When parents place a low value on having an unmarried daughter they will search hard to marry her off. So marriage migration will be frequent, distances large, and marriage will occur

more quickly. In addition, the willingness of at least some areas to marry their daughters within an extended family and looser or non-existent caste distinctions in others widens the marriageable pool within the village and helps explain some of the differences. A series of simple district level regressions demonstrates these relationships and shows that the model helps explain the differences across districts. As [Dyson and Moore \(1983\)](#) suggest, many of the differences in regional development in India come down to the treatment and value of women.

While recent work such as [Mazumdar, Neetha, and Agnihotri \(2013\)](#) has begun to collect information on the migration of women, studying marriage migration has all the difficulties of understanding migration in general. These problems are exacerbated with marriage migration since the marriage and migration decisions are typically made by the woman's parents and not the migrant. That means there is still much work to be done to understand marriage migration.

The consequences of marriage migration are even harder to discern. The results in this paper link marriage migration with lower autonomy and increased violence across districts, but it is much more difficult to understand what is going on within marriage markets. Since the outcome of any bargaining between families before marriage and between husband and wife within marriage is partly determined by the outside option, pervasive marriage migration hurts the bargaining power of all women, not just those who migrate. Understanding the consequences of marriage migration must take into account these equilibrium effects. Moreover, reducing the power of women within marriage may reduce not just their welfare, but that of the next generation since women are often the primary caregivers and their bargaining power helps determine the resources devoted to children ([Dunbar, Lewbel, and Pendakur, 2013](#)). Marriage migration may have direct effects on female power and autonomy by increasing the distance to a woman's birth family and so making it harder for her to seek support: 41% of women report they cannot visit their birth family and return the same day. Marriage migration is also a symptom of the overall lack of autonomy of Indian women. It seems an important step in understanding the extensive sex selective abortion in India, the maltreatment and excess mortality of girls and women, and the pervasive malnutrition and poor health among children, is acknowledging the central demographic fact that few women in India live where they were born, while most men do.

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