Moving for Marriage: When Does Migration Empower Women? *

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Abstract

Approximately two-thirds of Indian women migrate for marriage, with roughly one-fifth relocating across district boundaries. This paper investigates the consequences of marriage migration across districts and its impact on intra-household inequality. We first document new empirical facts on the relationship between sex ratios and marriage migration, showing that male-skewed sex ratios increase migration in rural areas but have no significant effect in urban areas. We then estimate a collective household marriage market model to understand the impact of marriage migration on women's bargaining power. We find that migration to rural areas lowers bargaining power, while migration to urban areas increases it. Counterfactuals show these patterns are not driven by selection but by destination-specific treatment. While dowry strongly reduces bargaining power, we find limited evidence of a dowry–migration trade-off.

Keywords: marriage migration, intra-household inequality, sex ratio

JEL Codes: J12, D13, R23

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1 Introduction

Within-household inequality is responsible for nearly one-third of total inequality in India (Klasen and Lahoti, 2021). Allocation of resources within the household is, on average, unfavorable for female partners, which, among others, results in their worse health conditions or higher mortality risk (Calvi, 2020). This inequality in access to household resources has economic, cultural, and social origins. One contributing factor could be marriage migration patterns. While most men migrate for work, 65% of women migrate for marriage[1], leaving the parental home to join the groom's family. Of these, 21% move across districts (within the same state), which requires crossing cultural borders. The practice of importing brides from another district might be driven by the shortage of eligible brides in certain areas - a result of skewed sex ratios. As a consequence, there is considerable regional variation in the share of marriage migrants, ranging from 8% to 40%.

While prior work has examined the determinants of across-district marriage migration and its causes (Fulford, 2013, 2015; Kaur, 2008; Rosenzweig and Stark, 1989), much less is known about its consequences for women's status within the household. On the one hand, women moving to another district might suffer from the increasing distance from their parental home. They leave behind their support structures and are exposed to discrimination due to cultural differences. On the other hand, women usually move to regions with more male-skewed sex ratios, which should increase their bargaining power as a result of more favorable marriage market conditions. As these mechanisms operate in opposite directions, their net effect is theoretically ambiguous. In this paper, we investigate the consequences of across-district marriage migration in India for within-household inequality. Specifically, we ask: does the across-district marriage migration strengthen or weaken female bargaining power within households?

Answering this research question requires data that captures the history of migration decisions and variables that allow the identification of bargaining power within households. However, no

[1] Source: Census of India 2001

single dataset contains all this information for India. Therefore, we adopt a multi-method approach that allows combining the 2001 Census, the 2006/07 National Sample Survey (NSS), and the 2005/06 India Human Development Survey (IHDS). The Census provides district-level sex ratios; the NSS contains complete migration histories, enabling us to identify women who migrated for marriage; and the IHDS provides detailed household consumption data needed to estimate bargaining power.

Our descriptive analysis provides an important fact: districts with more male-skewed sex ratios tend to experience higher levels of across-district marriage migration. We then estimate a logistic model to understand the determinants of migration decisions. Using a reduced-form approach allows us to examine the characteristics of women who choose to migrate across districts and the types of households that attract them, thereby providing insights into the factors influencing marriage migration patterns in the Indian context. Using NSS data, we show that while a significant positive impact of the sex ratio is observed in rural areas, the relationship is negative and insignificant for urban areas. Second, although more educated women are more likely to migrate, rural marriage migrants are still less educated than their husbands, consistent with education-based assortative mating. Lastly, in rural areas, women in scheduled tribes[2] and landowning households are less likely to have migrated for marriage.

We then develop a collective household model, following Blundell, Chiappori and Meghir (2005) and Lise and Seitz (2011), that offers a foundation for detailed analyses of changes in intra-household bargaining power due to marriage migration, using IHDS data. Because the IHDS data do not include information on whether a woman migrated across districts, we use our reduced-form logistic regression to predict the probability of across-district marriage migration. We estimate bargaining power for four groups of individuals, varying by migration status and destination: rural natives, rural migrants, urban natives, and urban migrants. We find that rural natives have slightly

[2]The Government of India classifies social groups into four categories: Scheduled Tribes, Scheduled Castes, Other Backward Classes, and the residual category is Other Social Groups. This is derived from the Constitution of India and Mandal Commission of 1980.

higher bargaining power than rural migrants, whereas among urban households, the reverse holds: urban migrants enjoy higher bargaining power than urban natives. Comparing urban and rural areas, urban areas have greater bargaining power, consistent with the idea that they have more relaxed norms. In terms of distribution factors, differences in education have a positive impact, whereas the dowry share has a negative impact across all four types.

In rural areas, compared with living in a district with a neutral sex ratio (middle tercile within the state), both natives and migrants exhibit lower bargaining power in districts with either a better sex ratio (lowest tercile, i.e. where women are relatively less scarce) or a worse sex ratio (highest tercile, i.e. where women are most scarce). This suggests that rural results are more heterogeneous and not easily reconciled with a simple supply–demand mechanism. For urban migrants, by contrast, the patterns align more closely with a supply–demand story: migrating to a worse sex-ratio district increases the sharing rule, while migrating to a better sex-ratio district reduces it, relative to neutral districts.

Focusing on state-level heterogeneity, we find that states in the east and west have the highest bargaining power, followed by those in the South and the North, respectively. A key contributor to this pattern appears to be differences in dowry intensity: dowries are substantially higher in the North and South than in the East and West, thereby lowering estimated bargaining power. An outlier is Kerala, which has the lowest bargaining power (due to the highest mean dowry share), despite having high educational attainment for women and a female-skewed sex ratio.

We then explore if the observed differences in bargaining power simply reflect selection into migration. We focus on likely natives (bottom quintile of predicted probability of migration) and likely migrants (top quintile of predicted probability of migration) and construct a counterfactual sharing rule for each group, i.e., the sharing rule they would have had if they had or had not migrated. This allows only variation in the model-estimated parameters, rather than in individual or household characteristics. In rural areas, likely migrants would be better off staying, whereas in urban areas, both likely natives and likely migrants gain from migrating, consistent with our main

results. This suggests that it is not observable or unobservable characteristics that matter, but how migrants are treated in their destination context.

Lastly, we explore whether there exists a trade-off between dowry and migration. We find a strong negative association between dowry share and women's bargaining power, and find some suggestive evidence that rural migrants in certain dowry quintiles pay relatively lower dowries than rural natives. However, these patterns are not robust across the distribution, and we find no consistent evidence of a dowry–migration trade-off in urban areas. Taken together, our results indicate that the gains from marriage migration are highly context-specific: in urban areas with skewed sex ratios, migration can strengthen women's bargaining positions, while in rural settings, migration is much less clearly empowering, especially when dowries are high and local norms are more restrictive.

This paper relates to several strands of literature. First, we contribute to the literature on marriage migration in India, especially long-distance or cross-regional migration. Kaur (2012, 2013) shows the importance of cultural differences across India for women's positions within households. In particular, women migrating from other regions face the burden of adjusting to another culture, which results in discrimination and domestic violence. The discrimination relates for instance to skin color or cultural elements (Chaudhry, 2019). Ahlawat (2009) shows that the consequences go beyond cultural adjustment cost. Moving far away from the parental home negatively affects women's mental health, and this effect is persistent even after several years of marriage. Additionally, a long distance from the parental home makes them more vulnerable (Kukreja and Kumar, 2013). Further, discrimination might be fostered by a negative media image of long-distance marriage migration (Mishra, 2021). Finally, Chaudhry and Mohan (2011) provides evidence that men who search for partners outside the district are negatively selected on landownership, age, prior marital status, or reputation. Our contribution is to provide the first structural evidence on how across-district marriage migration affects women's intra-household bargaining power, distinguishing sharply between rural and urban destinations.

Second, we contribute to the literature on sex ratios, the marriage market, and women's empowerment. Gender imbalance that results from strong son preferences leads to lower educational attainment, age at marriage, and labor force participation of Indian women (Anukriti, 2013). More recently, Beauchamp, Calvi and Fulford (2022) show that marriage-market imbalances shape women's mobility and agency in ways that depend strongly on local social norms, underscoring that the consequences of demographic scarcity are highly context-specific. Foster and Rosenzweig (2001) provide contrary evidence regarding women's employment and suggests that in the regions with more skewed sex ratios, the women's position within the household is higher. Kaur (2008) and Borker et al. (2022) show that the relationship between the sex ratio and the marriage market is not unilateral and includes dowries and the wife's migration to the husband's household. As the burden of marriage falls on the woman's family, it generates stronger preferences for sons and daughters-in-law, resulting in a skewed sex ratio (Alfano, 2017; Bhalotra, Chakravarty and Gulesci, 2020; Jayachandran, 2015).Bhaskar (2011) provides a theoretical model linking sex ratios, marriage markets, and gender-biased behavior. We complement this literature by showing empirically that sex ratios influence both migration flows and intra-household bargaining, but in opposite ways across rural and urban contexts.

Finally, we relate to the literature on dowries and intra-household allocation. In recent years, the size of dowry in India has increased rapidly (Edlund, 2006). Several explanations have been proposed: population growth and caste systems Anderson (2003, 2007); Rao (1993); Sautmann (2011), increase in quality of grooms (Chiplunkar and Weaver, 2020). The size of the payment to the groom's family is crucial because it directly affects women's bargaining power. Calvi and Keskar (2021) finds a strong negative relationship between dowry size and women's consumption share using a collective model, while Salem (2018) and Brown (2009) find similar conclusions outside India. Some qualitative studies argue that long-distance marriages involve lower dowries (Chaudhry and Mohan, 2011; Kaur, 2012), though systematic evidence is sparse. We extend this work by showing that while dowry suppresses women's bargaining power, there is little robust

evidence that dowry and migration substitute for each other in determining household allocations.

The rest of the paper is organized as follows. Section 2 discusses across-district marriage migration in India and presents a reduced-form model to analyze individual and household characteristics of female marriage migrants. In Section 3, we build and estimate a theoretical collective household model to examine the relationships among sex ratios, marriage migration, and women's bargaining power. Finally, Section 4 concludes.

2 Descriptive Evidence on Across-District Marriage Migration

In this section, we provide descriptive evidence on across-district marriage patterns, their relationship with sex ratios, and the characteristics of women and households involved in such migration. We first outline marriage patterns in India, then describe the datasets used in the analysis and present empirical evidence linking the sex ratio to the probability of marriage migration.

2.1 Marriage and Marriage Migration in India

Marriage in India is nearly universal, with only 2.2 percent of women remaining single in the 30-34 age group (Srinivasan and James, 2015). According to the Census 2001, the average age at marriage for women is 18.3 years, and for men, 22.6 years; however, the legal age at marriage for a woman is 18 years, and for a man, 21 years.

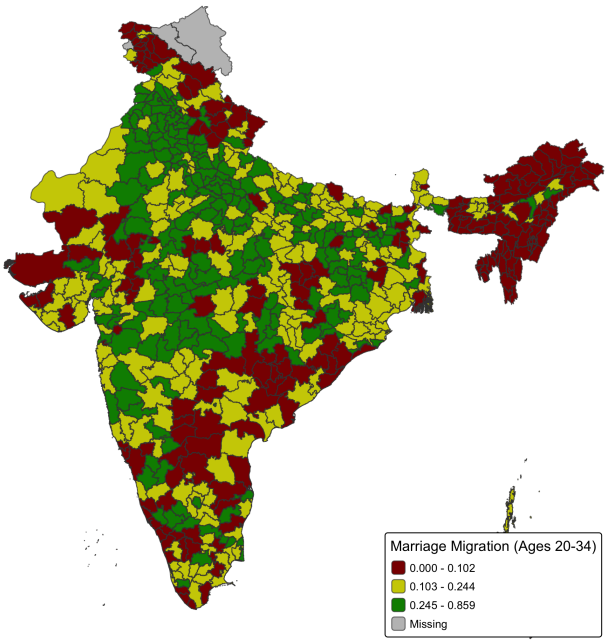
In India, when women marry, they move to their husband's house, a practice known as patrilocality. There are many rules that govern marriage in India: parents often decide and arrange the marriage, ensuring that their children marry within the caste (caste endogamy), and often within the same linguistic, regional, cultural, and religious communities. Between North and South India, a key difference is in the practice of village exogamy - in the north of India, females are married into households which are not in the same village (often even in the two-three villages in the nearby vicinity), whereas in the south, there are fewer restrictions on this (Jejeebhoy and Halli, 2005).

The bottom part of Table 1 shows statistics regarding marriage migration. In line with previous findings, most Indian women migrated for marriage[3]. Furthermore, 20% of all women migrate to the husband's household within the same state but to another district, indicating that across-district movement at marriage is a common phenomenon in India. This implies that a relatively high share of Indian women had to leave their home districts to live in another district with their husbands. However, only 4% of women migrated to another state due to marriage. Thus, while crossing the district border within the state for marriage purposes is a relatively common practice, moving to another state for the same reason is still relatively rare.

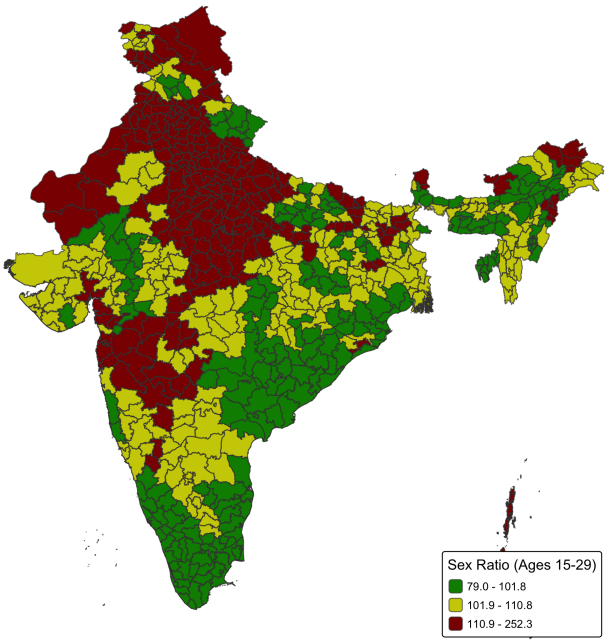
[3] 6.1% migrate for economic reasons and 19.3% do not migrate. Other reasons make up 0.71% of the sample.

Figure 1: Sex Ratio and Across-District Marriage Migration in India

(a) Marriage Migration



(b) Sex Ratio



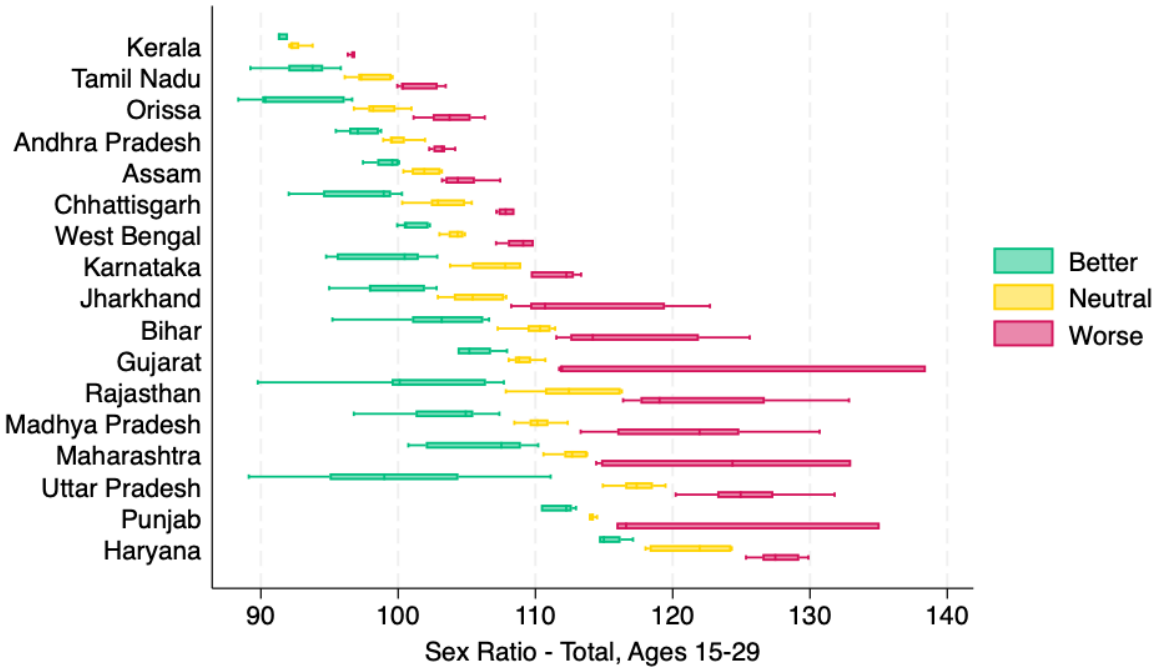
Source: Authors' calculations using Census of India 2001 and NSS 2006/7. *Notes:* 1. Sex ratio is measured as the number of men per 100 women for the age group of 15-29 years. 2. The proportion of female individuals who migrated for marriage outside of their district but within the state for the age group of 20-34 years is referred to as across-district marriage migration. 3. District boundaries have changed since 2006/07; therefore, we reconstructed newer districts by splitting their 2001/2006 parent districts to match the latest boundaries.

Marriage migration across districts in India is relatively common, but the intensity varies significantly across regions. Panel (a) of Figure 1 displays this spatial distribution. Districts are grouped into three categories by the intensity of marriage migration: high, moderate, and low. Four districts stand out, with over 70 percent of brides migrating across districts: Kannauj (Uttar Pradesh), Bhiwani (Haryana), Kurukshetra (Haryana), and Lohardaga (Jharkhand). These are located in the northern states, where most districts exhibit high levels of marriage migration. In contrast, such migration is less common in southern and western India, with some districts reporting few instances.

Across-district marriage migration can be influenced by factors such as variations in the sex ratio. Districts with a significantly higher number of men than women in the marriageable population may be a destination for women. In such districts, the marriage market tends to be more competitive, leading men to seek partners outside their own district. This mechanism is consistent with findings in Fulford (2013) and Kaur (2008). Panel (b) of Figure 1 illustrates the distribution of the sex ratio across different regions. Regions with highly skewed sex ratios are concentrated in the northern part of the country, while relatively balanced sex ratios are observed in the southwestern part of India. A clear spatial correlation emerges: districts with more male-skewed sex ratios tend to experience higher levels of across-district marriage migration. Thus, from Figure 1, we show that across-district migration increases with sex ratio, within and across states. These descriptive patterns document how sex ratios and across-district marriage migration are related, but they do not reveal how such migration affects women's position within their marital households. We return to this question in our structural analysis later.

However, these spatial patterns may reflect broad regional differences across states rather than variation within them. It may be that states with skewed sex ratios contain districts with high levels of marriage migration, yet this does not necessarily imply that women move from low to high sex-ratio districts. To verify this hypothesis, we focus on the relative sex ratio within each state. Figure 2 presents the variation in sex ratio within the state (ordered by mean sex ratio in

Figure 2: Variation of sex ratio within state in the NSS 2006/07 sample



Source: Authors' calculations from Census 2001 and NSS 2006/7. *Notes:* 1. Sex ratio is measured as the number of males per 100 females. Higher values, therefore, indicate a more male-skewed population. 2. Standardized values are constructed within states.

neutral districts). Significant variation in the sex ratio can be observed within a state. Therefore, focusing on districts with better and neutral sex ratios (first and second terciles, within state), the across-district marriage migration is 20 percent on average; this rises to 22 percent for districts with Worse sex ratios. Focusing on the correlation between standardized marriage migration and standardized sex ratio, the proportion of marriage migration within the district increases by 0.13 standard deviations, for each standard deviation increase in the sex ratio. In other words, as the sex ratio worsens, the prevalence of marriage migration increases. This implies that there is a significant positive correlation between sex ratios and marriage migration, *within state*.

2.2 Data Description

To quantify these patterns more systematically, we rely on two complementary data sources. The first dataset is the Census of India 2001, a national survey conducted every ten years to gather information on the Indian population. The second dataset is the 2006/07 National Sample Survey (NSS), a representative nationwide household survey.

We use the 2001 Census to construct sex ratios for the 15-29-year old group. We express the sex ratio as the number of men per 100 women. In India, the sex ratio is skewed towards men. Therefore, in the rest of the paper, the worsening of the sex ratio refers to an increase in the sex ratio in favor of men. Further, we standardize the sex ratio at the state level. We do so to account for the fact that most marriage migration occurs across districts within states, making within-state variation more relevant for identifying imbalances. Next, we divide districts into three categories based on terciles of standardized sex ratio, from the most skewed towards men to the least: worse, neutral, and better.

The NSS provides information on basic household demographic characteristics and labor activities. We use the 2006/07 survey because it includes detailed information on the migration history of all household members, enabling us to identify women who migrated across districts for marriage. This feature allows us to construct the probability of being a marriage migrant. The proportion of female individuals who migrated for marriage outside the district but within the state is referred to as the probability of marriage migration in this paper. We also construct a standardized measure of this variable.

For our analysis, we focus on the age group of 20 to 34 years for females in 2006/2007. Therefore, we construct the sex ratio for the 15-29 age group as a measure of marriage-market tightness. However, this measure has certain limitations. When analyzing 20- to 34-year-olds, the measure of tightness reflects only part of the cohort. However, Guilmoto and Attané (2007) finds no significant improvement in the child sex ratio between 1991 and 2001, suggesting that sex-ratio patterns were relatively stable across districts over this period. Therefore, the sex ratio for 15-29 years serves as

a good proxy for the tightness of the marriage market for the entire age group of 20 to 34 years.

2.3 Determinants of Across-District Marriage Migration

We now analyze the determinants of marriage migration in India using a reduced form approach. Due to data availability, we focus on women's individual characteristics and the household characteristics of the households they marry into. This allows us to understand what distinguishes women who leave their district due to marriage and which types of households are more likely to attract them. We will limit our analysis to the states that have a population of at least 20 million in 2001 [4,5]. Table 1 presents descriptive statistics for the NSS 2006/07 sample. The top and middle segment of the table provides individual and household characteristics. Regarding individual characteristics, the mean age of the sample is 27 years. Slightly more than half of the women in the sample have primary or higher education. Turning to household characteristics, fewer than one in five households belong to a non-Hindu religion. Most households are in rural areas, and more than half own land. The mean per capita consumption expenditure is around 1,000 rupees. Throughout the analysis, we restrict the sample to married women who remained within their birth state and either did not migrate or migrated for marriage. That is, we drop the 4.2 percent of married women aged 20–35 who migrated outside the state due to marriage. Therefore, the dependent variable y in our analysis is 1 for those who migrate outside the district but within the state for marriage, and is 0 for those who migrate with the district for marriage or did not migrate[6].

Formally, the probability that woman i in household h who lives in district d is a marriage migrant from another district but within the same state is:

$$\text{Prob}(y_{id} = 1) = L\left(\alpha_0 + \alpha_1 \log(sr_{id}) + X_i\beta + Z_h\gamma + \delta_{s(d)}\right) \tag{1}$$

[4]List of states in India by past population (Wikipedia)

[5]The states and UTs that are not included are: Jammu & Kashmir, Himachal Pradesh, Chandigarh, Uttaranchal, Delhi, Sikkim, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura, Meghalaya, Daman & Diu, Dadra & Nagar Haveli, Goa, Lakshadweep, Pondicherry, Andaman & Nicobar Islands.

[6]Further, we limit it to permanent migration which forms 96.7% of the sample.

Table 1: Demographic Characteristics of the NSS 2006/07 sample

	Mean	Std. dev
Individual:		
Age	27.776	4.504
Primary education or higher	0.499	0.500
Household:		
Non-Hindu	0.163	0.369
Urban	0.253	0.434
Landowners	0.549	0.498
Consumption per capita (in 1k INR)	0.947	0.678
Marriage migration:		
Migrant	0.738	0.439
Migrant from same state but different district	0.207	0.405
Migrant from another state	0.042	0.201
Sex Ratio, Age Group 15-29:		
Overall	108.049	9.914
Better Sex Ratio Districts	100.646	6.033
Neutral Sex Ratio Districts	107.782	7.045
Worse Sex Ratio Districts	115.870	10.396
Observations	44,303	

Source: Authors' calculations using NSS 2006/7. *Notes:* 1. The sample consists of married women aged 20-34. Please see Section 2.2 for further details. 2. A female is a marriage migrant if they change their place of enumeration due to marriage. 3. All statistics are computed using population weights. 4. We will limit our analysis to the states that have a population of at least 20 million in the year 2001.

Here, $L()$ represents the logistic transformation. The coefficient α_1 quantifies the impact of the sex ratio in district d, denoted by sr_{id}, on the likelihood of marriage migration. The vector X_i contains individual characteristics such as age and education, while Z_h contains household characteristics including the educational level of the household head, location of household (urban/rural), social group, household consumption, and landownership. Additionally, we control for state fixed effects denoted by $\delta_{s(d)}$.

We estimate this specification separately for urban and rural destination districts. Migration to a rural versus an urban district for marriage might reveal different motives; for instance, migration to urban districts may also be driven by economic opportunities or expectations of better living

conditions. Table 2 presents estimated coefficients for three models given by Equation 1 - all districts, rural districts, and urban districts.

Table 2: Logit Regression of Marriage Migration

	All	Rural	Urban
Log of sex ratio	1.060***	1.416***	-0.073
	[0.254]	[0.300]	[0.503]
Individual Characteristics:			
Age Difference, Male - Female	0.004	-0.002	0.016
	[0.007]	[0.008]	[0.012]
Female Education Years	0.046***	0.037**	0.049**
	[0.011]	[0.014]	[0.022]
Female Education Years × Female Education Years	0.000	0.001	-0.001
	[0.001]	[0.001]	[0.001]
Base Category: Female=Male Education Years			
Female < Male Education Years	0.182***	0.223***	0.027
	[0.039]	[0.045]	[0.079]
Female > Male Education Years	0.037	0.120	-0.119
	[0.060]	[0.076]	[0.100]
Household Characteristics:			
Base Category: Other Social Groups			
Scheduled Tribe	-0.318***	-0.368***	-0.165
	[0.079]	[0.087]	[0.191]
Scheduled Caste	0.023	-0.038	0.109
	[0.055]	[0.066]	[0.105]
Other backward classes	0.081*	-0.016	0.301***
	[0.047]	[0.057]	[0.085]
Log of consumption per capita	0.199***	0.142**	0.265***
	[0.045]	[0.058]	[0.079]
Landowners	-0.176***	-0.193***	-0.009
	[0.038]	[0.047]	[0.080]
Constant	-5.865***	-7.424***	-0.765
	[1.214]	[1.431]	[2.411]
Pseudo R^2	0.053	0.055	0.043
Observations	37,117	26,306	10,811
State FE	Yes	Yes	Yes

Standard errors are in parentheses; $^{*}p < 0.1, ^{**}p < 0.05, ^{***}p < 0.01$

Source: Authors' calculations from the NSS 2006/7. *Notes:* 1. The sample consists of all women aged 20-34 who did not move out of their birth state and if they migrated within state, the reason for migration was marriage. 2. Sex ratio is the number of men per 100 women in the age group of 15-29. 3. Household consumption is defined as monthly household expenditures per capita in thousands of Rupees. 4. Household owns land if the acreage possessed is more than 0.01 hectares. 5. The Government of India classifies social groups into four categories: Scheduled Tribes, Scheduled Castes, Other Backward Classes, and the residual category is Other Social Groups. This is derived from the Constitution of India and Mandal Commission of 1980.

First, the sex ratio is positive and significant for marriage migration in rural areas, but negative and insignificant in urban areas. This pattern is consistent with the idea that households are more likely to search for partners in other districts when the local marriage market is relatively tighter. By contrast, migration to urban areas may reflect factors beyond local marriage-market imbalances, including economic motives or the appeal of more modern social norms (Selod and Shilpi, 2021).

Second, although more educated women are more likely to migrate, rural marriage migrants are still less educated than their husbands, consistent with education-based assortative mating. This does not seem to be the case for urban areas. Third, among households, scheduled tribes and landowning households are less likely to have a woman who migrated for marriage in rural areas. Fourth, other backward classes are more likely to migrate to urban areas, suggesting that urban marriage migration may be partly influenced by economic or aspirational motives. Fifth, for both urban and rural areas, richer households are more likely to have a woman who migrated for marriage. It is important to emphasize that these are correlations, and no causal argument can be made. Moreover, the analysis pertains to characteristics of the district and household into which the woman marries, and we lack information about her origin district or pre-marriage household characteristics. This limits our ability to fully parse the determinants of migration decisions.

Table 3: Validation of Logit Regression

	Urban	Rural
Correctly Specified	0.61	0.62
Sensitivity	0.56	0.58
Specificity	0.64	0.63

Notes: 1. Correctly specified refers to when the logit model correctly identifies the positive and negative outcomes. A prediction is classified as positive when the probability p_j is greater than or equal to a cutoff c and negative otherwise. The cutoff is set to be the mean of the outcome variable for rural and urban areas separately. 2. Sensitivity refers to the fraction of $y_{id} = 1$ correctly classified. 3. Specificity refers to the fraction of $y_{id} = 0$ correctly classified.

Table 3 provides some validation of the logit regression. We present three measures for validation of the logit regressionpt: first, "correctly specified" refers to when the logit model correctly

identifies the positive and negative outcomes. A prediction is classified as positive when the probability p_j is greater than or equal to a cutoff c and negative otherwise. Given that the probability of marriage migration is not very close to 0.5, the cutoff is set to be the mean of the outcome variable for rural and urban areas separately. We achieve more than 60 percent success in predicting outcomes, comparable to the literature (Greene, 2003). We then look further into the prediction, given the outcome is either 0 or 1. Sensitivity refers to the fraction of $y_{id} = 1$ correctly classified. Specificity refers to the fraction of $y_{id} = 0$ correctly classified. These two measures move opposite to each other; i.e., as the cutoff c is increased, sensitivity will fall to 0, and specificity will rise to 1. Given the mean cutoff, we correctly predict 56 and 58 percent when the outcome is positive, and 64 and 63 percent when the outcome is negative, for urban and rural areas, respectively.

As mentioned earlier, the logit regression provides some insight into the correlates of across-district marriage migration; however, to understand whether marriage migration improves or worsens women's intra-household standing, we next turn to a structural framework that can more directly speak to bargaining power.

3 Structural Model of Intra-Household Bargaining

In this section, we describe the collective household model for identifying sharing rules within households. These sharing rules are related to partners' bargaining power and are commonly employed as a measure of intra-household gender inequality (Browning, Chiappori and Lewbel, 2013). We then present the data and estimation strategy of the theoretical model. Finally, we present the estimation results and discuss the mechanisms linking migration, sex ratios, and household characteristics to bargaining power.

3.1 Collective Household Framework

We consider households with two decision makers: man m and woman f. Each partner $j \in \{m, f\}$ has a distinct preference over own leisure ℓ_j, own private consumption c_j, and household public consumption C (Blundell, Chiappori and Meghir, 2005). We assume that preferences over private consumption and leisure are separable from consumption of the public good, i.e., $U_i(c_i, \ell_i, C)$ can be written as $U_i(u_i(c_i, \ell_i), C)$ (Lise and Seitz, 2011).

Total time endowment available to each member is T_j (which is normalized to 1); therefore, the time spent at work is given by $h_j = T_j - \ell_j$. The bargaining power μ can depend on wages (w_f, w_m), total resources y and distribution factors $\boldsymbol{z}$. We distinguish the potential (maximum) labor incomes of the husband and wife, $\bar{w}_m$ and $\bar{w}_f$, respectively, which can be earned by working full-time for men and part-time for women, from the actual labor incomes $h_m w_m$ and $h_f w_f$. Following the usual strategy in collective household models, we assume that the household's decisions are Pareto-efficient (Chiappori, 1988).

The household problem can be written as a two-stage problem (Blundell, Chiappori and Meghir, 2005). In the first stage, individuals agree on the level of public expenditures and on the distribution of non-labor income between them. In a general model where preferences over private consumption and leisure are not separable, public good consumption can affect the optimal private consumption and leisure through two channels: first, through the income effect that more public expenditure implies lower private consumption and thus, a tighter budget constraint; second, through the impact on the consumption-leisure trade-off. Under the assumption that preferences are separable, we can shut down the second channel. This implies that we only need to uncover the sub-utilities of private consumption and leisure, along with the sharing rule, to determine the share of total consumption allocated to each member (Blundell, Chiappori and Meghir, 2005). In the second stage, individuals choose their own levels of private consumption and labor supply, *conditional* on the level of public consumption C and the budget constraint, taking into account the division from stage 1.

Let the solution to the household problem be $\ell_i^*(w_f, w_m, y, z)$, $c_i^*(w_f, w_m, y, z)$, and $C^*(w_f, w_m, y, z)$. The conditional sharing rule $\phi(w_f, w_m, y, z)$ is the amount of residual non-labor income allocated to the wife after purchasing the public good. In the model, it takes the form of a transfer from the husband to the wife, which can be positive or negative. The share going to the husband is therefore $\bar{y}^{nl} - \phi(w_f, w_m, y, z)$, where $\bar{y}^{nl} = y_{nl} - C^*(w_f, w_m, y, z)$.

Thus, the standard household problem can be rewritten as an individual maximization problem, in which agents choose their labor supply and private consumption, subject to the constraints that they cannot spend more than their share of residual non-labor income and that public expenditures are at their optimal level. This implies that the second stage of the utility maximization problem for the male is:

$$\begin{aligned} & \max_{c_m, \ell_m} u_m(c_m, \ell_m) \\ \text{subject to:} \quad & c_m + (\bar{w}_m - h_m w_m) = \bar{w}_m + \bar{y}_{nl} - \phi(w_f, w_m, y, z) \end{aligned}$$

and for the female is:

$$\begin{aligned} & \max_{c_f, \ell_f} u_f(c_f, \ell_f) \\ \text{subject to:} \quad & c_f + (\bar{w}_f - h_f w_f) = \bar{w}_f + \phi(w_f, w_m, y, z) \end{aligned}$$

Following Lise and Seitz (2011), we do not attempt to estimate preferences for public consumption; rather, we condition on total public consumption expenditures C. It is important to note that the size of the transfer depends on the partner's potential earnings and distribution factors. This means that it does not depend on either spouse's labor supply choice.

3.1.1 Identification of the Sharing Rule

The sharing rule is straightforward to identify in the presence of distribution factors, and is generally identified up to an additive constant as long as there exists at least one distribution factor z_k that does affects the conditional choice probability Chiappori (1988); Chiappori, Fortin and Lacroix (2002). Distribution factors shift bargaining power without affecting preferences or the household budget constraint, enabling identification of how the sharing rule responds to exogenous variation in $\boldsymbol{z}$.

Following Browning et al. (1994) and Lise and Seitz (2011), we pin down the additive constant of the sharing rule by imposing a normalization: households at the baseline values of the covariates share full income equally. This is equivalent to setting the baseline sharing rule to 0.5. This normalization is a standard identifying restriction and does not imply that households with equal incomes share equally; rather, it provides a reference point from which differences in the sharing rule can be interpreted.

3.2 Data and Empirical Implementation

For the estimation of the collective household model, we use data from the 2005 India Human Development Survey (IHDS). This is a nationally representative multi-topic panel survey of households conducted in 1503 villages and 971 urban neighborhoods across India. We rely on the IHDS rather than the NSS because it contains detailed data on both public and private consumption, which is essential for identifying intra-household sharing rules and, ultimately, bargaining power.

To maintain consistency with the Census and NSS, we focus on females aged 18 to 33. We also restrict the analysis to states with a population of at least 20 million in 2001. Each individual's wage is their labor income and is determined by the hours worked. For farms and businesses, income is reported at the household level; thus, we treat it as household non-labor income. We

then set up a Heckman selection equation to generate any missing wages [7] and winsorize at the first bottom and top percentiles. Men have 3 choices: either not to work, work part-time (< 30 hours per week), or work full-time (≥ 30 hours per week). Women have two choices - work or not work. Work is not further divided into part-time and full-time due to the low employment rate. In practice, this means women can choose either not to work or to work part-time. We also account for the fact that women spend time working at home and assign 20 hours a week of domestic production time.

Full income is made up of non-labor income and estimated income if the husband worked full-time and the wife worked. Non-labor income is calculated as total income minus labor income. Public expenditure is calculated as a total of expenditure on kerosene, fuel/light, household items, housing/rent, servants, furniture, crockery, household appliances, jewelry and repair/maintenance, adjusted by an equivalence scale.[8] We drop households for which income minus public expenditure is missing, or if this value lies below the 5th percentile or above the 95th percentile, to reduce measurement error.

Lastly, IHDS has some information on marriage migration[9] but we do not know whether they migrated across the district. Therefore, we use the estimated logistic model from Table 2 to predict the probability of across-district marriage migration for the IHDS sample. Using this predicted probability of migration, we can determine whether the woman migrated across the district for marriage by treating the probability as a draw from a Bernoulli distribution. We conduct checks to see whether the predicted probability of migration behaves as expected: it is positively correlated with distance from the natal family and negatively correlated with whether the natal family is nearby or the husband is from the same village. These patterns hold for rural and urban areas.

[7] The inputs are potential experience, potential experience squared, education, state, and exclusion restriction: number of children under the age of 6. While experience is fairly similar, female wages are much lower than male wages. There are cases where the husband and wife have the exact same wage (which seems to be an anomaly). For these cases as well, we take the predicted Heckman wage.

[8] The equivalence scale used is $\sqrt{\text{Number of Adults} + 0.5\text{*Number of Children}}$

[9] We also know the time taken to travel to the natal home and whether they can make the trip in 1 day. However, this does not indicate whether a woman migrated across districts.

The summary statistics of the dataset are presented in Table 4, split by urban and rural districts. Most women in this sample do not work, with 72 percent not working. 63 percent of rural women do not work as compared to 87 percent of urban women. This number falls to 23 percent for men and is fairly similar across rural and urban areas. Men in urban areas work full-time at much higher rates (68%) than rural men (43%). Men are more educated than women (though the gap is smaller in urban areas), and individuals in urban areas are better educated than those in rural areas. In terms of household characteristics, although urban areas have higher potential income, households in these areas have a lower potential share of women. Dowry share (log of the share of dowry[10] as a proportion of total annual household income) is a lot higher in rural areas compared to urban areas. Urban areas have a greater prevalence of districts with a worse sex ratio, and the natal family is more likely to be better off relative to the husband's family. Lastly, the predicted probability of marriage migration is higher in urban areas than in rural areas.

[10]Our measure of dowry relies on question 4.4 of the IHDS women's questionnaire "*At the time of the marriage, how much money is usually spent by the girl's family* [in your community]?", which provides a lower and an upper bound that we average.

Table 4: Summary Statistics - IHDS dataset

Variable	All	Rural	Urban
Women:			
Age	27.08	27.11	27.01
Education	4.43	3.23	6.50
Not Working	0.72	0.63	0.87
Part-time	0.28	0.37	0.13
Men:			
Age	31.80	31.72	31.95
Education	6.34	5.42	7.92
Not Working	0.23	0.22	0.25
Part-time	0.24	0.35	0.07
Full-time	0.52	0.43	0.68
Household:			
Potential Income	683.87	585.36	853.38
Women Share (Potential)	0.25	0.29	0.18
Education Difference (Wife-Husband)	-1.91	-2.19	-1.43
Dowry Share	3.92	4.51	2.90
Sex Ratio - Better State	0.34	0.38	0.26
Sex Ratio - Worse State	0.29	0.27	0.33
Natal vs. Husband Family - Better	0.20	0.17	0.23
Natal vs. Husband Family - Worse	0.08	0.09	0.06
Predicted Marriage Migration Probability	0.28	0.26	0.32

Notes: 1. The sample consists of married women aged 18-32. Please see Section 3.2 for further details. 2. While the women's share is of the household's potential income, the dowry share is of actual annual household income. 3. In terms of whether the means are different across rural and urban areas, all variables, except for women's age, are significantly different. Men's age and the probability of a man not working are significant at the 5 percent level; all other variables are significant at the 1 percent level. *Source:* Authors' calculations using IHDS 2005

3.2.1 Empirical Specification and Estimation Strategy

The utility function is defined as follows:

$$u(c, \ell) = [\alpha c^{\rho} + (1 - \alpha)\ell^{\rho}]^{1/\rho} \tag{2}$$

where the share coefficient α and substitution coefficient ρ are allowed to vary by sex. We also allow the share coefficient to vary with education to capture heterogeneity in preferences.

We transform the share of household income (ϕ) to be transferred to the wife to ensure that the implied transfer lies between 0 and 1. Let $\varphi \equiv \frac{\bar{w}_f+\phi}{\bar{y}}$ and $1-\varphi \equiv \frac{\bar{w}_m+\bar{y}_{nl}-\phi}{\bar{y}}$ and $\boldsymbol{z} = (\bar{w}_f, \bar{w}_m, y, z)$. We parametrize φ as:

$$\varphi(\boldsymbol{z}) = \frac{\exp(\boldsymbol{z'}\varphi)}{1+\exp(\boldsymbol{z'}\varphi)} \tag{3}$$

We only allow for taste based preferences for work ϵ_{ij} and assume that it is distributed Type 1 Extreme Value.

Here, $\boldsymbol{z}$ refers to (i) difference in education between wife and husband; (ii) log of full potential household income; (iii) indicators for whether a household lives in a district with a better or worse sex ratio (relative to the state distribution); (iv) log dowry share (of household annual income); and (v) indicators for whether the natal family has higher or lower living standards than the husband's family. All of these variables are standardized - the difference in education and the log of full potential household income are demeaned. Log of dowry share is defined as logarithm of dowry[11] with respect to household annual income; i.e., the value of this variable is 0 when dowry equals the household's annual income. Lastly, for the sex ratio dummy, the baseline is the neutral sex ratio district, while for the natal family dummy, the baseline is when the natal family has the same standard of living as the husband's family.

Thus, the implied sharing rule equals 0.5 when all variables are at baseline values, i.e., when there is no difference in education between husband and wife, the log of potential income is equal to the mean, dowry is equal to annual household income, they live in a neutral sex ratio district for their state and have married into a household that they consider at par with their natal family. It is important to understand what equality means here, as this is the baseline with which we compare it.

[11]The question for dowry is: *At the time of the marriage, how much money is usually spent by the girl's family?* A range is asked and we take the average of this range.

The levels themselves matter less than how departures from the baseline shift the sharing rule. We estimate separate sharing-rule parameters for the four groups (rural natives, rural migrants, urban natives, urban migrants), allowing both migration status and destination to shape intra-household allocations.

Thus, the estimation proceeds as follows. First, we construct the predicted probability of migration for all households in the IHDS dataset using Table 2. Next, we estimate a Heckman selection equation to impute missing wages and construct potential household income. Finally, we estimate the preference parameters $(\alpha_f, \alpha_m, \rho_f, \rho_m)$ and the sharing rule parameters φ by searching for the set of values that maximizes the likelihood that household member i chooses labor supply ℓ_i, given the spouse's choice ℓ_j and the household's public good expenditures C^*. Standard errors are obtained using 100 simulation-based replications, where household migration status is repeatedly drawn from individual Bernoulli distributions implied by the predicted migration probabilities, holding the household sample fixed.

3.3 Estimation Results

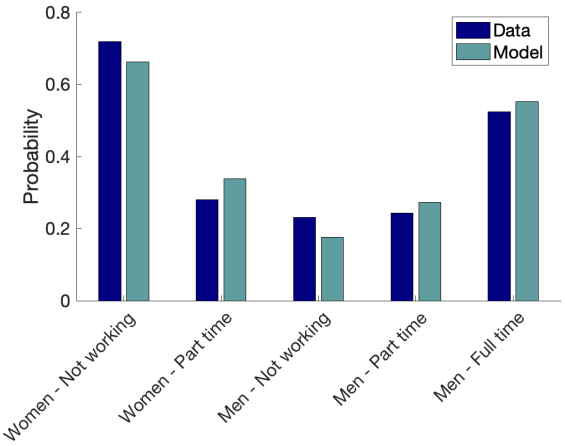
We now present estimation results from the collective household model. In particular: model fit, estimated preference parameters, sharing rule and state-level heterogeneity.

3.3.1 Model Fit and Preference Parameters

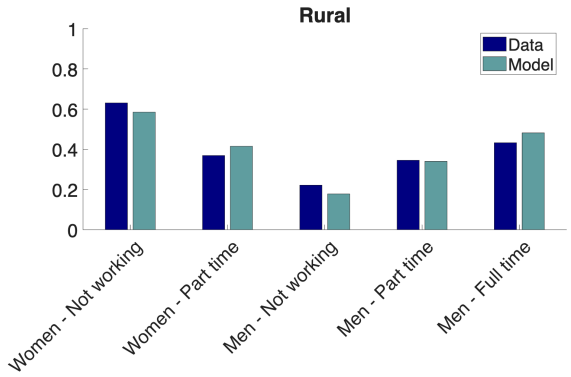
We first present a model fit graph in Figure 3 to provide a basis for the claim that these estimates recover the households' true preferences. From subplot (a), the model fits the data well for both males' and females' labor supply choices, although we slightly under-predict the probability of males and females not working. Subplots (b) and (c) provide untargeted moments for rural and urban areas; the model reproduces these patterns well, including capturing the high rate of non-employment of females in urban areas, thus providing an additional measure of model fit. The

summary of the parameter estimates is presented in Table 5, and the full set of estimates is presented in Appendix Table A.1.

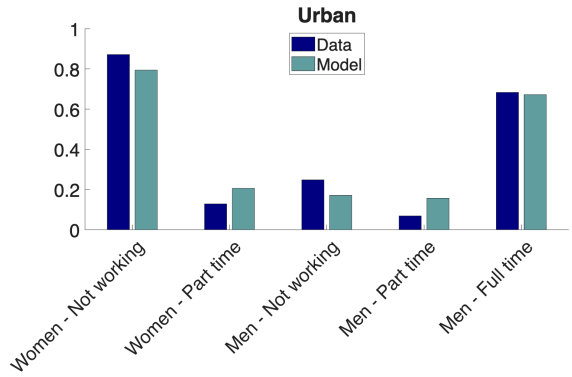
Figure 3: Model Fit



(a) Overall - Targeted



(b) Rural - Untargeted



(c) Urban - Untargeted

Source: Authors' construction of probabilities using model estimates. Please refer to Section 3 for further details on estimation.

The elasticity of substitution $\frac{1}{1-\rho}$ between private consumption and leisure is marginally higher for females (0.76) as compared to males (0.75). As both values are less than 1, this indicates that private consumption and leisure are complements for both genders. The average importance of consumption in the utility function for females is significantly higher (0.78) than that for males (0.49). This is consistent with labor supply models where women face tighter consumption con-

straints, have less disposable leisure due to unpaid household responsibilities, and exhibit lower participation in market work. As importance of consumption in the utility function vary by education, the coefficient for female education is positive, whereas that for male education is negative. This implies that more educated wives place relatively greater weight on private consumption, while more educated husbands place relatively greater weight on leisure. These preference parameters are stable across specifications and align with values typically found in collective household models.

Table 5: Main Parameter Estimates from Collective Household Model

	Estimate	SE	95% CI Low	95% CI High
ρ_f	-0.322	0.003	-0.327	-0.316
ρ_m	-0.331	0.012	-0.354	-0.308
α_f	0.785	0.002	0.781	0.789
α_m	0.489	0.008	0.474	0.504
Sharing Rule:				
Rural Native	0.437	0.002	0.434	0.441
Rural Migrant	0.427	0.006	0.415	0.439
Urban Native	0.473	0.003	0.467	0.480
Urban Migrant	0.487	0.008	0.470	0.504

Notes: Standard errors are constructed from 100 simulation-based replications of the model. Please refer to Section 3 for further details on model and estimation.

3.3.2 Sharing Rule: Role of Sex Ratios and Natal Family

Focusing on the sharing rule, we present the sharing rule for four types of households - rural natives, rural migrants, urban natives, and urban migrants. Rural natives are those who do not migrate across districts and stay in the rural area after marriage, while rural migrants are those who migrate to a rural area across districts for marriage. The destination (urban or rural) is known from the IHDS dataset, while the native or migrant is constructed from the predicted probability of marriage migration from the NSS data.

We find that rural natives have a higher sharing rule than rural migrants (0.44 vs 0.43 respec-

tively), indicating that those who migrate to rural areas are marginally worse off than those who choose not to migrate for marriage. The opposite is observed in urban areas: those who choose to migrate have higher bargaining power (0.49) than those who choose to stay (0.47). Across all categories, households residing in urban areas exhibit higher sharing rule values than rural households, consistent with the idea that urban environments relax traditional norms and provide conditions more favorable to female decision-making authority.[12] Together, these findings indicate that the relationship between migration and bargaining power differs substantially by destination, rather than following a uniform pattern.

In terms of the distribution factors that affect the sharing rule (Table 6), the following variables have a similar impact for all four types. The difference in education has a positive impact. Potential income negatively affects the sharing rule, with the strongest effect among urban natives. As full income increases, a smaller share will be allocated to the wife relative to the husband; however, this does not necessarily mean the level is lower. A similar finding is seen in Lise and Seitz (2011). Unsurprisingly, the dowry share negatively affects the sharing rule. Keeping annual household income constant, higher dowries are associated with lower female bargaining power (Anderson and Bidner, 2015; Brown, 2009; Calvi, 2020; Calvi and Keskar, 2021; Salem, 2018). The weakest impact of dowry is for urban migrants.

[12]These findings remain robust when we use alternative definitions of migration—such as classifying women who live more than six hours from their natal family as migrants, or classifying women who can travel to and return from their natal family in the same day as natives. See Appendix Table A.2.

Table 6: Model Parameter Estimates- Sharing Rule

	Rural Native		Rural Migrant		Urban Native		Urban Migrant	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Difference in Education	0.004	0.002	0.000	0.006	0.006	0.004	0.008	0.009
Log of Potential Income	-0.210	0.020	-0.237	0.057	-0.365	0.036	-0.258	0.064
Sex Ratio Better	-0.175	0.016	-0.149	0.043	0.013	0.033	-0.137	0.077
Sex Ratio Worse	-0.174	0.019	-0.261	0.060	0.162	0.023	0.127	0.080
Log of Dowry Share	-0.162	0.006	-0.171	0.024	-0.181	0.018	-0.087	0.037
Natal Family Status Better	-0.131	0.015	-0.111	0.067	0.155	0.035	0.245	0.091
Natal Family Status Worse	-0.064	0.012	-0.012	0.068	-0.005	0.078	0.286	0.122

Notes: Standard errors are constructed from 100 simulation-based replications of the model. Please refer to Section 3 for further details on model and estimation.

Focusing on sex ratio, for urban natives, being married in a neutral or better sex ratio district results in nearly identical bargaining power; marrying in a worse sex ratio district has a strong positive impact on bargaining power. A similar pattern holds among urban migrants: a worse sex ratio raises the sharing rule, whereas a better sex ratio reduces it, relative to neutral districts. These patterns are consistent with a supply-and-demand interpretation in urban areas, where women are relatively scarce, and their bargaining position appears stronger.

In rural areas, compared with migrating to a neutral sex-ratio district, both rural natives and migrants have lower bargaining power when the sex ratio is either better or worse. Although rural natives exhibit similar negative effects in better and worse districts, the negative effect is considerably larger for rural migrants residing in worse sex-ratio districts. This raises the question of whether the other characteristics are the same for individuals in rural areas. Households in neutral sex ratio districts in rural areas are less likely to own land and more likely for both the man to work full-time and the woman to work, which suggests that neutral districts differ systematically in economic structure and female labor market opportunities (Appendix Table A.3). This is not seen in urban areas. Taken together, rural estimates appear more heterogeneous and less consistent with a simple supply–demand mechanism, suggesting that local economic conditions and social

norms interact with sex ratios in more complex ways than in urban settings.

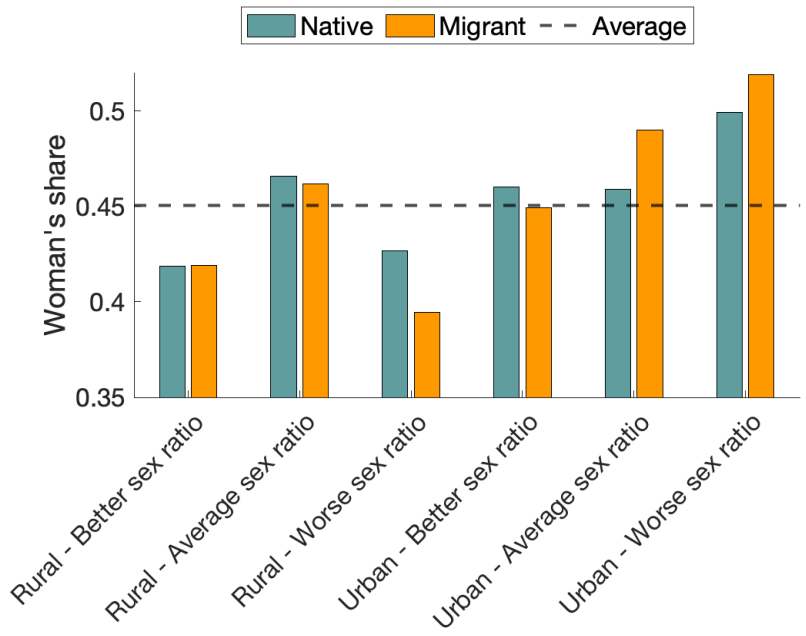
Lastly, we compare the coefficients for whether the natal family's economic status is better or worse than the husband's family's. In rural areas, the impact of marrying into a better- or worse-status family reduces bargaining power, irrespective of whether the spouse is a native or a migrant, relative to that of similar-status natal and husband families. The decline is larger when the natal family is better off than the husband's family. One possible interpretation is that, in rural settings, women who *marry down* economically may face binding constraints in the marriage market that weaken their post-marital bargaining position—for example, they may have had fewer acceptable matches or more constrained outside options. Because we observe limited information about a woman's natal family, this interpretation is suggestive rather than definitive, but it is consistent with the negative coefficients we estimate.

In urban areas, we observe the opposite pattern: marrying into a family of lower economic status (i.e., a better-off natal family) increases women's bargaining power. For urban migrants, the positive impact is even stronger when the natal family is worse off than the husband's family. One possible explanation is that urban marriage markets are more flexible and less bound by traditional norms, allowing relative family resources or characteristics to translate more directly into bargaining power. In addition, migration into urban areas may be driven by economic or aspirational motivations, potentially strengthening the role of individual characteristics such as education. Consistent with this, we find notable education differences across groups. Among urban natives, women from better-off natal families have substantially higher education (7 years) than those from similar-status families (6.2 years) or worse-off families (5.3 years). For urban migrants, a similar pattern emerges: those whose natal families are better off have the highest education (7.3 years), followed by those marrying into worse-off families (6.8 years), while women whose natal and marital families have similar status have the lowest education (6.6 years). These education gradients suggest that migration and relative family status amplify each other's influence on women's bargaining positions in urban settings.

Since the sex ratio captures marriage market tightness, we also plot sharing rule distributions by rural and urban areas, further splitting districts into better, neutral, and worse sex-ratio categories (Figure 4). The patterns reinforce our earlier results: urban areas exhibit a clear supply–demand mechanism—women have higher bargaining power in worse sex-ratio districts—whereas rural areas are more heterogeneous, consistent with local economic conditions and social norms interacting with sex ratios rather than a simple market mechanism. The figure also highlights how neutral sex ratio districts vary across space, despite being the omitted category in the parametric specification.

Within rural areas, natives have marginally higher bargaining power than migrants. In contrast, within urban areas, migrants have substantially higher bargaining power than natives. Two factors play an especially important role in driving these urban gaps. First, although urban migrants tend to be richer, the negative effect of potential income on the sharing rule is smaller for migrants than for natives, yielding a net advantage for migrants. Second, urban migrants are more likely to 'marry down', into households poorer than their natal family, and this variable has a strong positive association with bargaining power in urban settings. For the remaining variables, urban migrants have a larger difference in education, higher dowry shares and less likely to marry into families where the economic status is better than the natal family relative to urban natives.

Figure 4: Variation in Sharing Rule by Urban and Rural Areas



Source: Authors' construction of probabilities using model estimates. Please refer to Section 3 for further details on estimation.

In summary, migration strengthens women's bargaining power in urban areas but not in rural areas, reflecting fundamentally different destination environments and the interaction of sex ratios, economic conditions, and social norms.

3.3.3 State-Level Heterogeneity

As demonstrated by Figure 1, there is a significant variation across state characteristics; therefore, a state-level analysis would be useful. Table A.4 presents the bargaining power of the four types. States in the East and West tend to have the highest bargaining power, followed by those in the South, and then by those in the North. A key contributor to this pattern appears to be differences in dowry intensity: dowries are substantially higher in the North and South than in the East and West, thereby lowering estimated bargaining power.

The state with the lowest bargaining power is Kerala, primarily due to the highest dowry share

of 5.68. Although Kerala is the only state with a strongly skewed sex ratio in favor of women, our specification uses within-state indicators (better/worse) rather than absolute sex-ratio values; thus, the sex ratio does not directly enter the state-level comparison. Therefore, despite being the only state where women have, on average, higher educational attainment than their husbands, Kerala's exceptionally high dowries dampen women's estimated bargaining power.

The pattern of urban migrants having higher bargaining power than urban natives remains consistent across states, with only Madhya Pradesh as an outlier. Similarly, the finding that rural natives have slightly higher bargaining power than rural migrants generally holds, with the largest differences appearing in Northern and Southern states.

Regional heterogeneity is also evident in the magnitude of native–migrant gaps. The gap between natives and migrants is smallest in the West, both in urban and rural areas. The largest gap between natives and migrants is in rural areas of the South, indicating that it is better to marry and stay within the district, whereas in urban areas, it is in the Northern and Eastern states. The states with the largest gaps in rural areas are Tamil Nadu, and in urban areas are Jharkhand and Haryana.

3.4 Mechanisms

We now explore possible mechanisms that may help explain the observed patterns. In particular, we analyze the selection into migration, and a potential trade-off between across-district marriage migration and dowry size.

3.4.1 Selection into Migration

In analyzing the estimates, it is natural to ask whether the observed differences in bargaining power simply reflect selection into migration—that is, whether women who migrate differ systematically in characteristics that also shape their intra-household allocation. To answer this, we separate women by quintile of predicted probability of migration, focusing on the bottom quintile (least likely to migrate and thus likely natives) and the top quintile (most likely to migrate and thus likely

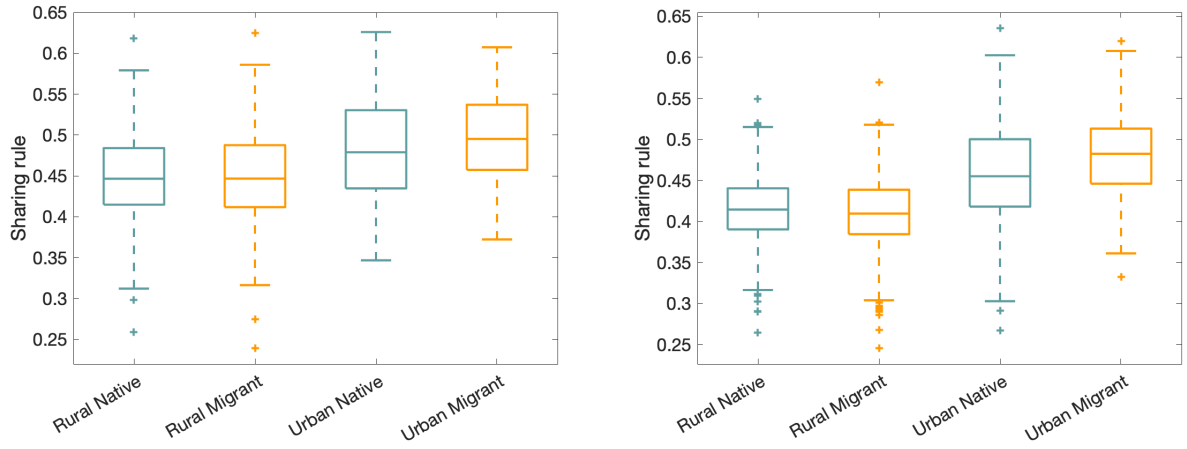
migrants).

For each subgroup, we then construct a counterfactual sharing rule: for likely natives, we compute the sharing rule they would receive if they had migrated (while holding their characteristics and rural/urban location fixed); for likely migrants, we compute the sharing rule they would receive if they had not migrated. This exercise isolates the effect of the migration status itself, since only the sharing-rule coefficients change, while all individual and household characteristics are held constant.

Figure 5 presents these results as a box plot for likely natives and likely migrants. Focusing on women who are likely to be natives, we construct their bargaining power by sharing rules for natives and migrants, without changing rural or urban areas. In subplot (a), for these likely natives, those in rural areas are marginally better off being natives, while for those in urban areas, likely native women would have been better off if they had migrated. Focusing on subplot (b), in rural areas, likely migrants would have been better off if they had not migrated; in urban areas, likely migrants would have been worse off not having migrated.

Thus, this analysis further cements the point that observable or unobservable characteristics do not drive bargaining power, but rather the differential treatment of migrants at their destination. These findings remain robust when we use alternative definitions of migration—such as classifying women who live more than six hours from their natal family as migrants, or classifying women who can travel to and return from their natal family in the same day as natives.

Figure 5: Variation in Sharing Rule as Natives and as Migrants for Likely Natives and Likely Migrants



(a) Likely Natives (b) Likely Migrants

Source: Authors' construction of sharing rule using model estimates. *Notes:* 1. Likely Natives refers to women in the bottom quintile of predicted probability of migration. 2. Likely Migrants refer to women in the top quintile of predicted probability of migration.

In addition, we construct similar graphs while splitting districts into better, neutral, and worse sex-ratio categories (Appendix Figure A.1). These results show that while likely natives have higher absolute bargaining power than likely migrants, the relative treatment effects of migration remain unchanged across sex-ratio contexts. This confirms that our main results are not driven by selection into migration but by how migrants are treated at their destinations.

3.4.2 Dowry and Migration: Is There a Trade-Off?

The existing literature suggests a correlation between women's bargaining power and the size of a dowry (Anderson and Bidner, 2015; Brown, 2009; Calvi, 2020; Calvi and Keskar, 2021; Salem, 2018). Figure 6 presents the variation in bargaining power between households that received a dowry smaller than their annual household income (HAI) and households that had a dowry larger than their HAI, by destination and migration status.

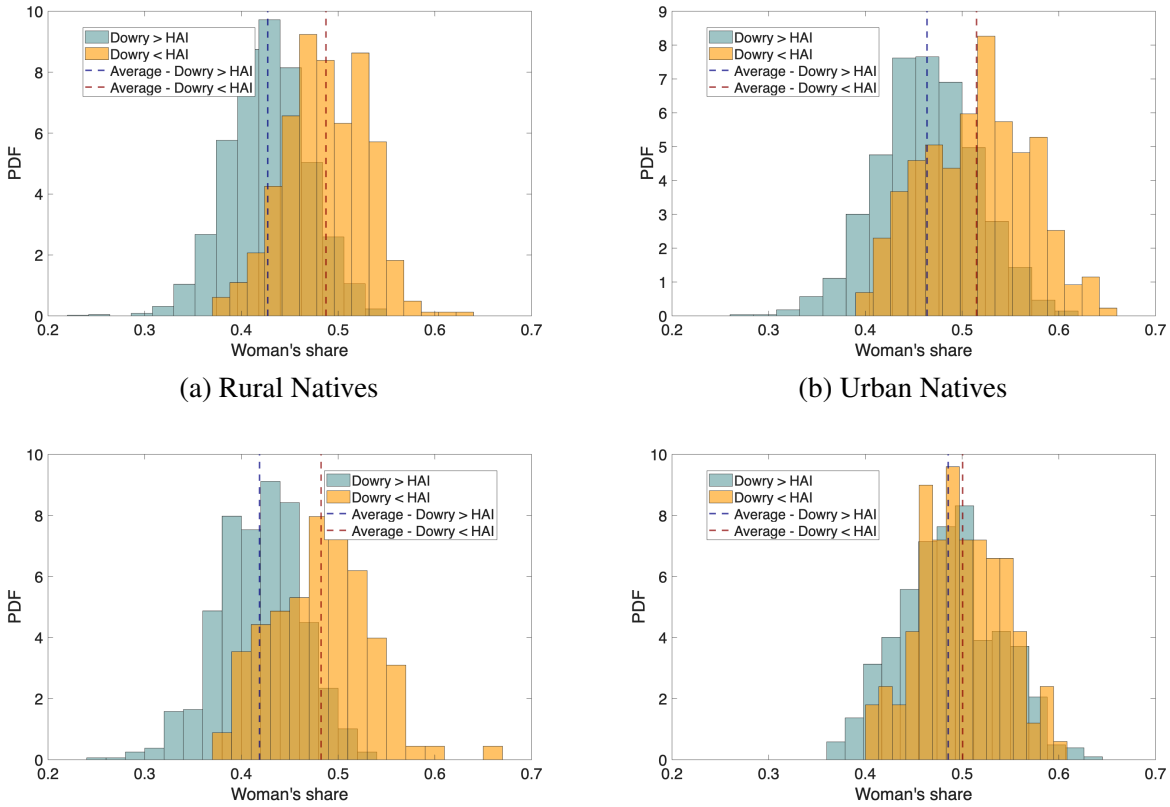
Households that pay a dowry below the HAI are more likely to have higher bargaining power

of the wife by a significant margin, except among urban migrants. For urban migrants, this margin is tight, as evidenced by the parameter estimate for the log dowry share. Interestingly, the spread of bargaining power is observed in rural areas (natives and migrants) as well as among urban natives. Urban migrants have the most overlap between the two distributions, indicating that dowry plays a very small role in the sharing rule.

However, we use a binary separation here: whether the dowry is above or below HAI. Conditional on being one of these types, the value of the dowry share itself might be different. Exploring this gives us a preliminary sense of whether there is a trade-off between migration and dowry, as suggested by some literature. Table 7 presents these shares by the four types for quintiles of dowry share. These quintiles are calculated separately for urban and rural areas, but not by migrant status. At an overall level, the dowry paid by rural migrants is the highest at 4.52, compared to 2.87 for urban migrants. For rural migrants, a lower dowry share is observed in quintiles 2, 3, and 5, with the difference being statistically significant only for quintiles 2 and 3. This suggests there may be a trade-off between migration and dowry for rural areas, but it is not robust.

For urban migrants, the dowry share is equal across quintiles 2 and 3 and lower in quintiles 4 and 5; however, these differences are not statistically significant, except for quintile 4. This would lead us to conclude that migration is not being used as a means to trade off dowry for urban areas. Similar results are observed when using other measures of migration, such as distance from family or whether the woman can travel within a day and return to her natal family home. Lastly, we do not observe a consistent pattern in female education when comparing households above and below the mean, suggesting no clear mechanism by which education, together with migration, dampens the effect of dowry on bargaining power. The exception is among urban migrants, where women with education above the mean are more likely to have lower dowries for the top 2 quintiles.

Figure 6: Distribution of Women's Bargaining Power by Dowry Share



(a) Rural Natives

(b) Urban Natives

(c) Rural Migrants

(d) Urban Migrants

Source: Authors' construction of probabilities using model estimates. *Notes:* HAI refers to annual household income.

Table 7: Dowry Share as a function of Migrant Status and Destination

	Rural Native	Rural Migrant	Urban Native	Urban Migrant
Quintiles of Dowry Share				
1	0.70	0.75	0.66	0.74
2	1.63	1.56	1.38	1.38
3	2.54	2.50	2.09	2.09
4	4.03	4.10	3.15	3.10
5	13.97	12.78	7.34	7.18
Average	4.51	4.52	2.92	2.87

Notes: Quintiles of dowry share are calculated separately for rural and urban areas.

4 Conclusion

This paper investigates the consequences of marriage migration across districts and its impact on intra-household inequality, as measured through bargaining power. On one hand, women might move to regions with more male-skewed sex ratios, which could result in a more favorable marriage market; on the other hand, these women are far from their natal family and could be exposed to discrimination due to cultural differences.

We combine three datasets—the 2001 Census, the 2006/07 NSS, and the 2005/06 IHDS—to address these questions using a multi-method approach. First, we document descriptive evidence on across-district marriage migration and show that it increases with the sex ratio, both across and within states. Using NSS data, we estimate a reduced-form logit regression and find that more male-skewed sex ratios significantly increase marriage migration in rural areas but have a negative, insignificant impact in urban areas.

To understand the impact of across-district marriage migration on intra-household bargaining, we estimate a collective household model, following Blundell, Chiappori and Meghir (2005) and Lise and Seitz (2011), allowing the parameters of the sharing rule to vary by the migration status and destination of migration (rural native, rural migrant, urban native, and urban migrant), using IHDS data. We find that rural natives have slightly higher bargaining power than rural migrants, whereas among urban households the reverse holds: urban migrants enjoy higher bargaining power than urban natives. In rural areas, compared with migrating to a neutral sex-ratio district, both natives and migrants have lower bargaining power when the sex ratio is either better or worse, indicating that rural results are more heterogeneous and less consistent with a simple supply–demand mechanism. For urban migrants, a worse sex ratio raises the sharing rule, whereas a better sex ratio reduces it, relative to neutral districts, indicating a clear supply-and-demand story.

We next examine whether the estimated differences in bargaining power simply reflect selection into migration. Using counterfactual sharing rules for women who are ex ante likely natives or

likely migrants, we show that holding characteristics fixed, switching migration status generates changes in bargaining power that mirror our baseline results: in rural areas, likely migrants would be better off not migrating, whereas in urban areas, both likely natives and likely migrants would gain from migrating. This indicates that differences in bargaining power are driven less by selection and more by differential treatment of migrants at their destination.

Lastly, we explore whether there is a trade-off between dowry and migration. While dowry is a strong negative predictor of women's bargaining power overall, evidence of a dowry–migration trade-off is limited. We find suggestive evidence for this in rural areas, but no robust pattern in urban areas. In conclusion, this suggests that the effects of migration are highly context-specific: in urban areas, migration can strengthen bargaining power (where market forces can dominate), but in rural areas (where traditional norms might dominate), migration offers little advantage.

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Appendices

A Appendix Tables and Figures

Table A.1: Model Parameter Estimates - Utility Function

	Estimate	**SE**	**95% CI Low**	**95% CI High**
ρ_f	0.279	0.002	0.275	0.283
ρ_m	0.286	0.009	0.268	0.303
α_f, Constant	-1.295	0.013	-1.321	-1.269
α_f, Education	0.020	0.003	0.014	0.026
α_m, Constant	0.044	0.031	-0.017	0.106
α_m, Education	-0.083	0.004	-0.090	-0.076

Source: Authors' calculations from the model

Table A.2: Sharing Rule by Destination with Alternative Specifications

Type	Original	Distance from Family	Natal Family Nearby
Rural Native	0.438	0.436	0.435
Rural Migrant	0.427	0.424	0.434
Urban Native	0.473	0.472	0.473
Urban Migrant	0.488	0.487	0.487

Source: Authors' calculations from the model *Notes:* 1. Original refers to the model estimates when migration is classified according to the predicted probability of migration from the NSS data. 2. Distance from family refers to classifying migrants as those who stay 6 hours or more from their natal family. 3. Natal family nearby refers to classifying migrants as those whose natal family do not live nearby enough that they can travel within a day.

Table A.3: Sharing Rule Inputs by Sex Ratio and Urban

Sex Ratio Type	Women-Working	Men-Working FT	Landowners
Rural			
Better	0.37	0.43	0.47
Neutral	0.39	0.47	0.45
Worse	0.34	0.39	0.47
Urban			
Better	0.16	0.63	0.06
Neutral	0.12	0.69	0.04
Worse	0.11	0.72	0.04

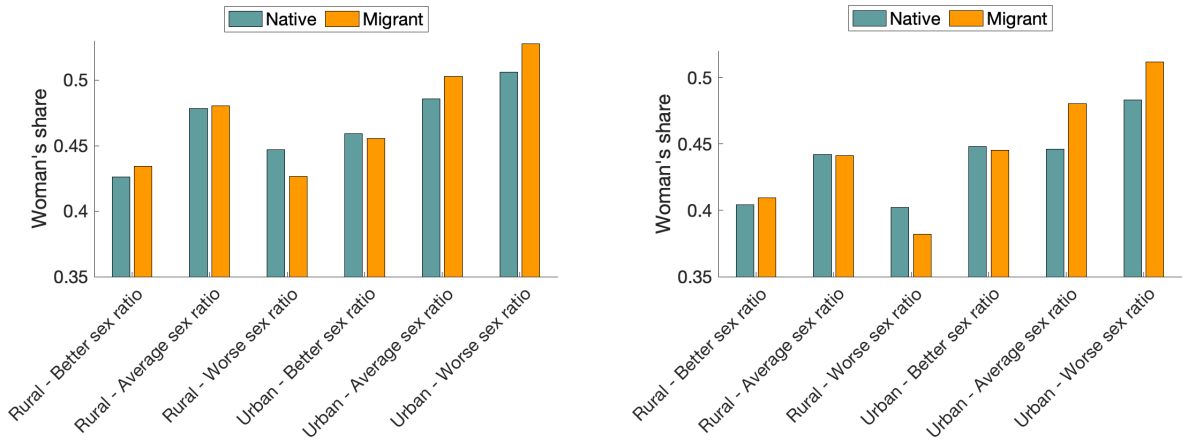
Source: Authors' calculations from the model

Table A.4: Sharing Rule by State

State	Rural Native	Rural Migrant	Urban Native	Urban Migrant
North				
Mean	0.424	0.415	0.454	0.478
Haryana	0.413	0.413	0.415	0.456
Punjab	0.420	0.409	0.445	0.467
Rajasthan	0.431	0.423	0.455	0.462
Uttar Pradesh	0.423	0.417	0.468	0.501
East				
Mean	0.453	0.443	0.483	0.508
Assam	0.480	0.506	0.504	0.505
Bihar	0.451	0.463	0.469	0.488
Jharkhand	0.442	0.417	0.471	0.539
Orissa	0.446	0.449	0.481	0.510
West Bengal	0.446	0.435	0.485	0.501
West				
Mean	0.444	0.442	0.488	0.493
Chhatisgarh	0.471	0.473	0.452	0.459
Gujarat	0.429	0.430	0.485	0.487
Madhya Pradesh	0.442	0.440	0.509	0.504
Maharashtra	0.443	0.437	0.489	0.505
South				
Mean	0.430	0.419	0.468	0.484
Andhra Pradesh	0.446	0.435	0.484	0.489
Karnataka	0.416	0.419	0.463	0.484
Kerala	0.398	0.378	0.424	0.457
Tamil Nadu	0.444	0.407	0.468	0.481

Source: Authors' calculations from the model

Figure A.1: Variation in Sharing Rule by Sex Ratio Type for Likely Natives and Migrants



(a) Likely Natives (b) Likely Migrants

Source: Authors' construction of sharing rule using model estimates. *Notes:* 1. Likely Natives refers to women in the bottom quintile of predicted probability of migration. 2. Likely Migrants refer to women in the top quintile of predicted probability of migration.