Extended family migration decisions: evidence from Nepal

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Received: 10 July 2020 / Accepted: 2 July 2022 / Published online: 26 October 2022
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Abstract
Extended families are a common feature of developing country households and have a large influence on individual family members’ decision to migrate. This paper generalizes the Mincer (J Polit Econ 86(5):749–773, https://doi.org/10.1086/260710, 1978) model of husband-wife migration by including decision makers from the extended family. The model with extended families predicts that migration decisions may become freer than in the husband-wife model because spouses are not more likely to be tied to their partners than members of the extended family. That is, marital status is a smaller deterrent to migration in extended family settings relative to nuclear families. Using data from 2011 and 2016 Nepal Demographic and Health Surveys, I show that husbands are more likely to migrate without their spouses (i.e., leave their wives behind) from extended families than nuclear ones.

Keywords Migration · Household · Nepal · Tied movers · Extended family

JEL Classification J15 · J61

Introduction
Family plays a decisive role in the decision to migrate. The relevance of husband-wife (nuclear) families in forming migration decisions and how these decisions differ from the motivations of single persons is a recurring topic of concern in the economic and sociological literature. Married couples are understood to have a smaller degree of freedom in the decision to migrate as they aim to maximize the welfare of the family as a whole rather than their own individual net benefit. Long (1974) showed empirically that married men in the US are less likely to migrate within/between counties and across states than unmarried men. This evidence was formalized in a neoclassical model of family migration decision in Mincer (1978)

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and family altruism in Becker (1981). Massey et al. (1993) reiterates the evidence through a sociological perspective with further evidence provided in Maxwell (1988). Miller (1976) and Speare and Goldscheider (1987) further stress the importance of the family life cycle in the decision to migrate. More recent evidence by McKinnish (2008) and Tenn (2010) show tied-ness of the wife to the husband’s migration decision through smaller wage returns and opportunities for employment after migration. Moreover, Miller (1976) is the first paper to take up extended families and how the presence of extended family members will impact the family migration decision. Several papers like Banerjee (1981, 1982, 2009), Dumon (1989), Bhattacharya (1993), Bhattacharyya (1985), and Root and De Jong (1991) introduce extended family members within the context of developing countries where such families are a common feature. They find that family migration is a function of the extended families’ involvement in the migration decision process, such that, the extended family can influence the decision of the nuclear family.

A recent paper by Ngenzebuke et al. (2018) in the context of Burundi shows that the presence of the extended family members has a positive effect on female decision making power. Moreover, the size and proximity of the extended family also matter to females’ asset-related decision making power. However, the paper finds that a larger number of the males’ kin lives in the same village as the couple compared to the female’s kin which live in other villages. This is probably either due to customary practice where the female moves to adjacent villages for marriage or because of females’ tied-ness to the husbands migration decision. In either case, these findings suggest that females might have decision making power in their household but could still be tied to their male counterparts migration decision. Or, as suggested in Amirapu et al. (2022) females exercise their independence by choosing marriage as a means to migrate from rural areas. The paper uses a natural experiment of a bridge built between Dhaka and surrounding rural areas that reduced travel time and migration costs for rural households. Independent female migration did not increase, but marriage with rural-born men for the purpose of migration did increase. The main reason for this is the stigma and social norms associated with independent females migrating to urban areas for economic reasons. One interpretation could be that women do have a degree of agency in how they navigate the social norms of their rural place. Marriage might be used as a means for women to access a better life for themselves and their children in urban areas.

Rajkarnikar (2020)’s paper within the context of Nepal is closely related to this study. Rajkarnikar (2020) uses the Demographic and Health Survey 2011 for her study and finds that women who take on the role of household head hold more decision making power within the household. However, the presence of others in the household, such as extended family members, dilutes woman’s influence. Men migrating without their spouses gives women some autonomy and control over the household’s resources but also more responsibility. But this degree of control and responsibility is conditional on factors like education level, presence of children, ownership of tillable agricultural land or the presence of extended family members. Other studies by Yabiku et al. (2010), de Haas and van Rooij (2010), and Desai and Banerji (2008) find mostly mixed results in the degree of autonomy and responsibility that passes on to females (or wives) that are left behind. But all these studies
agree that the presence of extended family members moderates women’s autonomy while responsibilities may be shared with extended family members.

As previously mentioned, even though the presence of the extended family members might lead to fewer decision making powers for the women whose spouses have migrated for work, the women themselves might still be free from their spouses’ initial migration decision. Rajkarnikar (2020) is unable to account for the selection into migration among couples where men migrate without their spouses. In this study I contribute to the wider literature on women’s decision making by looking at how factors like the presence of extended family members could lead to less tied-ness to men’s migration decision.

The husband-wife model is an important contribution to understanding migration in developed countries where households are essentially "nuclear". However, the extended family household is the dominant family structure in developing countries (Bongaarts and Zimmer 2002). The complexity of the extended family differs by region but is nonetheless prolific. Extended family structures are complex as they include the nuclear family, plus grandparents, uncles, aunts or cousins. Migrants from developing countries leave behind some portion of the family structure and the migrating part of the household is only a subset of the complete family structure. It is highly unlikely that migration leaves an “empty household”.

The relevance of the household in individual migration decisions cannot be understated (Mincer 1978; Massey et al. 1993). The household’s characteristics play an important role in determining whether migration is valuable, or not, to the point that it determines the extent of the push toward it. Kley (2011) draws attention to the migration decision process. Potential migrants have place utility and at the pre-decision stage form expectations about the attainment of valued goals in the host country (taking into consideration the pull factors). However, within the pre-decision stage potential migrants will weigh the effects of their actions on peers and household members. Certain household characteristics will lead to a lower likelihood of migration because of high economic, social and emotional costs. The constraints imposed by marital status on the migration decision within nuclear families do not carry over without complications when considering the presence of extended family members. Extended families may further constrain the nuclear family migration decision or encourage nuclear family migration (Root and De Jong 1991). However, lesser understood is the fact that the presence of extended family members may dissolve nuclear family migration and present a new situation where one spouse migrates while the other remains. The migration observed in these situations may be predominately temporary but is an important dimension to consider because of its potential impact on female autonomy within the household and tied-ness to their husband’s migration decision. The tied-ness of the spouse is given a new dimension as he/she becomes no more tied to members of the extended family than his/her own spouse. The goal of this research is to uncover the conditions under which such situations appear in the Mincer (1978) model and present empirical evidence for these cases.

Mincer (1978)’s model with husband-wife decision makers works well in understanding the type of migration that occurs in western industrialized countries where households are commonly nuclear. As such, marital status is a deterrent to individual
migration decisions and married men are significantly less likely to migrate than unmarried men. Mincer (1978)’s model when applied to the developing world should predict a lot less married men migration than what is currently observed. Instead, a significant amount of married men migration (without their spouses) does take place. This is shown to be the case using recent data on Nepali households. While there is a lot of research looking at the intersections between individual decisions and household characteristics on economic outcomes where migration is the mechanism (Mincer 1978; Becker 1981; Borjas and Bronars 1991; Banerjee 1981, 1982, 2009; Dumon 1989; Bhattacharya 1993; Bhattacharyya 1985; Root and De Jong 1991), few studies have looked at the immediate impact of family characteristics on migration as an outcome.

Furthermore, Mincer (1978) model predicts significant tied-ness of the spouse to the husband’s decision in the US where households are typically nuclear. I show that married men (without their spouse) migration are more likely than couple migration in extended families than nuclear ones. That is, the presence of extended family members either frees the spouse’s decision to migrate or ties the spouse to the extended family member. Since Rajkarnikar (2020) was able to show that the presence of extended family members leads to less decision making power among women stayers, it is more likely that women are tied to their extended family members.

The estimation strategy of this paper is to provide justification for the implications of the theoretical model using data from Nepal. Unlike Mincer (1978) and Becker (1981) where individual migrants within the household are expected to be tied-stayers or tied-movers to the migration decisions of the spouse; in the model of this paper there are further inter-dependencies with members of the extended family that may free the migration decision. The deterrent effect of marital status on migration decisions as predicted in Mincer (1978) are only special conditions of a more general migration decision process in an extended family. The presence of extended family members will dampen the effect of marital status on migration decisions and the prevalence of tied-movers.

The set-up of the paper is as follows: a theoretical model is provided, followed by an empirical test of the model. And finally the conclusion.

Theoretical model

I will develop a model of the individual’s migration decision in an extended family structure. Similar to Mincer (1978), I assume that all migration decisions exclude children. However, children are quite relevant for household decisions, so their presence is treated for appropriately in the empirical section. The model extends migration in a husband-wife household and considers the role of extended family members. There are only two countries: the sending country and the receiving country. Let \( G_i \) be the net benefit to individual \( i \) such that if \( G_i > 0 \) then the individual’s private calculus indicates a gain from migrating. Likewise \( G_i \leq 0 \) indicates a preference to staying. The net benefit of migrating to an individual \( i \) is decomposed as
\[ G_i = R_i - C_i + v(s_i), \]

where \( R_i - C_i \) is the standard economic returns minus cost and \( v(s_i) \) is the value to individual \( i \) from living as a unit with \( s \) other family members. It is assumed that \( v'(s_i) > 0, v''(s_i) < 0 \) and \( v(0) = 0 \). The individual net benefit \( G_i \) for each individual \( i \) in the family is a measure of the net economic benefit of migrating had this individual made an independent decision. The total net benefit for a household with \( n \) members and \( m \) are married to each other, if all migrate, will be

\[ G_f = G_1 + G_2 + \cdots + G_n. \]

In a husband-wife household (\( n = 2 \) and \( m = 2 \)) any differences in the net benefits of migration between spouses are associated with tied migration. The subscripts denote \( 1 = \) husband and \( 2 = \) wife. The net benefit of migration to the husband and wife from migrating together are

\[ G_1 \mid (s_1 = 1) = R_1 - C_1 + v(1) \]
\[ G_2 \mid (s_2 = 1) = R_2 - C_2 + v(1), \]

where conditional notation is adopted to indicate \( i \) is living with \( s_i \) other family members. On the other hand, the net benefit to the husband from migrating alone is

\[ G_1 \mid (s_1 = 0) = R_1 - C_1 \]
\[ G_2 \mid (s_2 = 0) = 0. \]

The wife is a tied mover if she faces a negative return to migration, \( R_2 - C_2 < 0 \), and the family gains from migrating as a unit if \( G_1 \mid (s_1 = 1) + G_2 \mid (s_2 = 1) > G_1 \mid (s_1 = 0) + G_2 \mid (s_2 = 0) \) or \( R_2 - C_2 + 2v(1) > 0 \). This is the conclusion produced in Mincer (1978). In fact, in the \( n = 2 \) case, the spouse with lower returns to migration becomes tied to the other’s decision.

This model differs in the case when \( n > 2 \), with the presence of an extended family member. Suppose the household consists of \( 1 = \) husband, \( 2 = \) wife and \( 3 = \) extended family member. If the husband and wife migrate together their net benefits are identical to the \( n = 2 \) case. But if the husband migrates alone leaving the wife behind with the extended family member the wife receives a larger payoff

\[ G_1 \mid (s_1 = 0) = R_1 - C_1 \]
\[ G_2 \mid (s_2 = 1) = v(1). \]

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1 The model presented in Mincer (1978) and extended in this paper assume away sociological considerations concerning gender-roles ideology or some other within-household roles held by members of the extended family. Under this assumption, the net benefit is simply a sum of un-weighted individual net benefits. Certainly, gender-roles ideology play a significant role in family migration decisions as it brings into question the sufficiency of net economic benefit as an explanation for tied-ness. For instance, if the husband assumes a role of provider in the family, the mutually recognized right to exercise power in the family migration decision will discount the wife’s net economic gain (or loss) from a prospective geographic move (Bielby and Bielby 1992).
Now the wife is a tied mover if she faces a negative return to migration, \( R_2 - C_2 < 0 \), and the nuclear family gains from migrating as a unit if \( G_1 | (s_1 = 1) + G_2 | (s_2 = 1) \geq G_1 | (s_1 = 0) + G_2 | (s_2 = 1) \) or \( R_2 - C_2 + v(1) > 0 \). Since \( R_2 - C_2 + v(1) \) is strictly less than \( R_2 - C_2 + 2v(1) \) from the \( n = 2 \) case, the wife is less likely to be tied to migrate with the husband in the presence of an extended family member. In other words, the presence of the extended family member changes the benefits of migration for the wife by increasing the benefits of staying from zero to \( v(1) \). This is also the hypothesis I will be testing in the empirical analysis. Note that a more detailed analysis of the theoretical model is provided in the appendix.

**Data**

To test the implications of the model I use households recorded in the 2011 and 2016 Demographic and Health Survey (DHS) for Nepal. Nepalis have migrated to many countries around the world but for the purposes of this study I am interested in households that have supplied migrants to India or within Nepal. The DHS records demographic, health and economic information of 21,866 (10,826 in 2011 and 11,040 in 2016) households in Nepal, out of which 50.49 percent are migrant households. This data set is a more reliable indicator of actual migration than the census because of the extent of undocumented migration that occurs between India and Nepal.\(^2\) The 2011 National Population and Housing Census recorded 25.42% of all households with an absent migrant member, which is small in comparison to the 50.49 percent recorded in the DHS. Furthermore, the DHS is better for the purpose of studying the structure of the household alongside migrant characteristics. There are no other surveys that capture the migrant’s personal characteristics and pre-migration family characteristics in sufficient detail.

The unit of analysis for this study is the household in the sending country. There is likely to be some attenuation bias associated with entire households migrating leaving no extended family behind to provide a response on the DHS.\(^3\) Given the importance of extended families in Nepal, attenuation bias is not a major issue using the DHS because the total number of migrants closely resembles the Nepal Living Standards Survey (National Planning Commission Secretariat 2011) and the Census (National Planning Commission Secretariat 2012). There were 11,215 migrants recorded in the 2011 DHS (18.38% of total population) and 8,996 in the 2016 DHS (15.49% of total population). The Nepal Living Standards Survey 2010–2011 figure estimated the absentee population\(^4\) was 20% of total population (absentees plus non-absentees). Similar results are also found using the census. The census identifies 1,921,494 absentees out of 5,423,297 total individuals (26.16% of total population).

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\(^2\) More so due to the trafficking of women and children (Datta 2005). The difficulty in accurately estimating migration numbers is presented in Sharma and Thapa (2013).

\(^3\) This was mentioned previously as leaving an “empty household”.

\(^4\) Members of the household that have been away for a prolonged period of time.
Nepal-India migration is a widely studied area of economic and sociological research. India and Nepal maintain open borders and have close historical, cultural and economic ties (Dutt 1981). Based on data from the 2011 Census of India (National Planning Commission Secretariat 2012), 15 percent of total persons born outside of India were from Nepal, the majority of whom are female (10%). Nepali migration to India is concentrated in certain occupations and geographic regions of India. Nepali’s are involved in the tea gardens of West Bengal (Datta 2005), as sex workers in Calcutta (Datta 2005), as watchmen in factories (Dutt 1981) and as gurkhas of the Indian army (Dutt 1981). The largest concentration of Nepalis across states are in Bihar (31.38%), Uttar Pradesh (15.32%), Maharashtra (6.98%), Himachal Pradesh (6.95%), Uttarkhand (5.69%), National Capital of Delhi (4.11%), West Bengal (3.85%), Punjab (3.73 percent) and Haryana (3.23%). The economic factors that push Nepali migration are caused by “increasing fragmentation of landholding, indebtedness, ecological crisis through intense cultivation and deforestation, rising population without further land to cultivate and chronic deficits in food production” (Dutt 1981). The pull factors from remittances (Seddon et al. 1998) are important as well. By excluding Nepali’s that have migrated to other countries the sample is reduced by 38%. Restricting to this smaller sample of migrants I avoid a bulk of the issues relating to unobservable political and cultural differences between Nepal and the receiving country. Some of the receiving countries that are excluded from this sample are Saudi Arabia, Qatar, Malaysia and Dubai. The Gulf countries do not offer citizenship to Nepali’s and have very strict visa requirements for migrant workers. The visa requirement for Gulf countries entail that wives must be sponsored by the husband and all husbands must be holding a full-time job. Thus all migration to the Gulf countries must involve a tied or trailing spouse to the husband’s migration decision. Tied-ness in this sense would not be due to the controlled net benefits of migration but from exogenous visa requirements. Including this sample would not serve as an appropriate testing ground for the implications of the theoretical model as it would severely bias the results.

Empirical findings

The empirical hypothesis of this study is: spouses are less tied in their migration decisions within extended family settings relative to nuclear families. Firstly, using statistics from the DHS, I present the relevance of the extended family in Nepal within the migration context. Secondly, I show that migrant husbands (without their wives) are significantly more likely in extended families than nuclear families.

Descriptive analysis

In this section, I present the relevance of extended families and their characteristics for migration in Nepal by the following three implications: (1) how relevant is the extended family structure among Nepali households? (2) among the households’ migrant members, is the dominant motive to migrate based on factors related
to private individual gains? and (3) what is the extent of migrant husbands among Nepali households?

For the rest of this study I pool the 2011 and 2016 DHS. The justification of the relevance of the extended family structure in Nepal is easily established. Table 1 depicts family structure in Nepal based on relationship to the head of the household. About 24% of households have an in-law, 22% have grandchildren, 5% have a brother/sister, 9% have some other relative (uncle/aunt/cousin/etc.), and 2% have an unrelated person (renter or friend) living within the household. The presence of extended family members is a common feature of family structure in Nepal.

Table 1

| Number of persons | In-laws | Percent | Grandchildren | Percent | Brother/sister | Percent | Other relative | Percent | Unrelated | Percent |
|-------------------|---------|---------|---------------|---------|---------------|---------|---------------|---------|-----------|---------|
| 0                 | 16,542  | 75.65   | 17,037        | 77.92   | 20,750        | 94.90   | 19,877        | 90.90   | 21,421    | 97.96   |
| 1                 | 4422    | 20.22   | 2066          | 9.45    | 862           | 3.94    | 1352          | 6.18    | 346       | 1.58    |
| 2                 | 798     | 3.65    | 1484          | 6.79    | 189           | 0.86    | 347           | 1.59    | 50        | 0.23    |
| 3                 | 88      | 0.40    | 737           | 3.37    | 52            | 0.24    | 162           | 0.74    | 27        | 0.12    |
| 4                 | 13      | 0.06    | 307           | 1.40    | 10            | 0.05    | 60            | 0.27    | 14        | 0.06    |
| 5                 | 2       | 0.01    | 125           | 0.57    | 2             | 0.01    | 27            | 0.12    | 4         | 0.02    |
| 6                 | 1       | 0.00    | 59            | 0.27    |               |         | 15            | 0.07    | 2         | 0.01    |
| 7                 |         |         | 23            | 0.11    | 1             | 0.00    | 11            | 0.05    |           |         |
| 8                 |         |         | 13            | 0.06    |               |         | 6             | 0.03    |           |         |
| 9                 |         |         | 10            | 0.05    |               |         | 5             | 0.02    |           |         |
| 10                |         |         | 2             | 0.01    |               |         | 1             | 0.00    |           |         |
| 11                |         |         |               |         |               |         | 1             | 0.00    |           |         |
| 12                |         |         | 2             | 0.01    |               |         | 1             | 0.00    |           |         |
| 13                |         |         | 1             | 0.00    |               |         | 1             | 0.00    |           |         |
| 14                |         |         |               |         |               |         | 1             | 0.00    |           |         |
| 16                |         |         |               |         |               |         | 1             | 0.00    |           |         |
| Total             | 21,866  | 100.00  | 21,866        | 100.00  | 21,866        | 100.00  | 21,866        | 100.00  | 21,866    | 100.00  |

The tables do not include migrant members that have moved away.

To show that the dominant motive for migration is based on private individual gains alone (i.e., the justification of implication (2)), I examine stated reasons for migration. These are illustrated in Table 2. There are many motives for migration: work, study, marriage, other family, or security. It would be unreasonable to suppose that an individual’s incentive to migrate involves economic motives but removes from the non-economic ones. That being said, I am interested in incentives aimed at understanding the tied-movers (if any) involved. This particular aim removes study and marriage as a relevant incentive because it should not involve any tied-movers. Work, other family and security related motives are relevant for private motives and may
involve some tied-movers. Less than 1% of households reported members moving for security reasons and 6% reported moving due to other family. I will rule out security as a relevant motive for migration due to its small number. Other family, although small in proportion, does seem to matter for migration. Other family is an important motive for understanding tied-movers because there is good reason to suppose that pioneering migrant members from a household had economic motives for migrating but subsequent members migrated for other family reasons, although these might actually be economic reasons. Also, trailing spouses would fall under this category.

Migration might occur in groups or as a chain. To determine the intensity of chain migration (i.e., migrant members that leave the household and move to the same location as previous migrant members) as a motive behind Nepali migration it must be compared to group migration (i.e., a group of individuals that move out of the household and are destined to the same location and in the same time period). Frequencies for group and chain migration are displayed in Table 3. It appears that

| Number of migrants | Work | Study | Marriage | Other family | Security |
|--------------------|------|-------|----------|--------------|----------|
|                    | Count | Percent | Count | Percent | Count | Percent | Count | Percent | Count | Percent |
| 0                  | 14,549 | 66.54 | 19,602 | 89.65 | 18,044 | 82.52 | 20,516 | 93.83 | 21,848 | 99.92 |
| 1                  | 5630 | 25.75 | 1660 | 7.59 | 2934 | 13.42 | 659 | 3.01 | 13 | 0.06 |
| 2                  | 1352 | 6.18 | 456 | 2.09 | 733 | 3.35 | 365 | 1.67 | 4 | 0.02 |
| 3                  | 259 | 1.18 | 114 | 0.52 | 136 | 0.62 | 181 | 0.83 | |
| 4                  | 58 | 0.27 | 27 | 0.12 | 16 | 0.07 | 70 | 0.32 | 1 | 0.00 |
| 5                  | 15 | 0.07 | 6 | 0.03 | 3 | 0.01 | 42 | 0.19 | |
| 6                  | 2 | 0.01 | 1 | 0.00 | | 18 | 0.08 | |
| 7                  | 1 | 0.00 | | | | 4 | 0.02 | |
| 8                  | | | | | | 3 | 0.01 | |
| 9                  | | | | | | 4 | 0.02 | |
| 10                 | | | | | | 2 | 0.01 | |
| 11                 | | | | | | 1 | 0.00 | |
| 12                 | | | | | | 1 | 0.00 | |
| Total              | 21,866 | 100.00 | 21,866 | 100.00 | 21,866 | 100.00 | 21,866 | 100.00 | 21,866 | 100.00 |

| Chain | Group | Total |
|-------|-------|-------|
|       | No    | Yes   |       |
| Count | Percent | Count | Percent | Count | Percent |
| No    | 3184 | 14.56 | 17,449 | 79.80 | 20,633 | 94.36 |
| Yes   | 1233 | 5.64 | 0 | 0.00 | 1233 | 5.64 |
| Total | 4417 | 20.20 | 17,449 | 79.80 | 21,866 | 100.00 |
group migration is more common for Nepali migration than chain. Nepali households supply migrants to various locations with some randomness in the years. This is indicative of a risk diversification strategy in the supply of migrants (Stark and Levhari 1982; Lucas and Stark 1985; Morten 2019; Katz and Stark 1986). 5.64% of all migrant households exhibit chain migration patterns and 79.80% migrate as a group. A few migrant households exhibit neither group nor chain migration at 14.56%.

The final implication (3) is difficult to establish as the DHS does not record the migrant’s relationship to the head of the household. This relationship information is essential to determine the extent of tied-movers as would be predicted by the husband-wife model. Tied movers in group migration is commonly understood as a nuclear portion of the extended family migrating while tied-movers in chain migration is associated with the trailing spouse, and none of these were of great importance among migrant households. However, this evidence does not completely remove the possibility of tied-movers in the decision to migrate from extended families because I am not dealing solely with husband-wife couples. The inability to identify migrant members’ relationship to non-moving members of the household, I instead use the following reasoning: children under the age of 5 are unlikely to migrate without their mother/father, and thus the children among non-movers/movers must have their mother/father present as well. Table 4 depicts the incidence of migrant households with children living elsewhere or within the household, presumably with their father and/or mother. A very small number of migrant households have children under the age of 5 living elsewhere (439 migrant households or 7% of all migrant households), presumably with their mother/father; and many more

| Number of persons | Migrant Count | Migrant Percent | Non-migrant Count | Non-migrant Percent |
|-------------------|--------------|----------------|-------------------|---------------------|
| 0                 | 21,440       | 98.05          | 13,283            | 60.75               |
| 1                 | 353          | 1.61           | 5652              | 25.85               |
| 2                 | 67           | 0.31           | 2411              | 11.03               |
| 3                 | 6            | 0.03           | 431               | 1.97                |
| 4                 | 70           | 0.32           |                    |                     |
| 5                 | 16           | 0.07           |                    |                     |
| 6                 | 2            | 0.01           |                    |                     |
| 7                 | 1            | 0.00           |                    |                     |
| Total             | 21,866       | 100.00         | 21,866            | 100.00              |

Migrant children ages are adjusted for the years elapsed since migration.

5 Only 5 children under the age of 5 were reported to be without a parent or caretaker present.
migrant households have children under the age of 5 living with non-movers (2,351 migrant households or 40% of all migrant households), presumably among them is their mother/father.\(^6\)

Implication (3) requires that children and mothers (or fathers) that remain with the non-movers must also have husbands (or wives) that migrated. As previously mentioned, I am not able to determine the relationship of the persons that migrated to the persons that remained. Instead I have parent alive (or dead) and living within households (or not living within the household) information for children under the age of 5 among those that remained in Nepal. I identify children under 5 years as the starting point; then determine whether the child’s father/mother is alive; if the father/mother is alive, whether he/she lives in the household and is currently identified as married; if he/she does not live in the household then he/she must be a migrant; I pair the alive mother living in the household with the alive father living elsewhere and categorize them as the “migrant husband” pair. Similarly, I am able to identify the “migrant wife” pair. This reasoning is presented as Fig. 1 in the Online Appendix and the results are presented in Table 5. Based on this definition no household reported a migrant wife but 24% of households reported a migrant husband.

The final step is to determine the frequency of migrant husband-wife pairs; that is, the incidence of husbands and wives moving together. I deconstruct group migration into male-female pairs as an upper bound proxy for husband-wife pairs. Due to the inability of directly extracting relationship information among migrant members, I use an alternate route: pairs of migrant members at least 18 years of age at the time of migration and migrating to the same location but of different sex.\(^7\) Although an inaccurate

\(^6\) The remaining 53% of migrant households have no children under the age of 5 within the household.

\(^7\) They may migrate at different times to account for the trailing spouse.
and generalized proxy for migrant couples, the frequency estimated is an upper bound; a more accurate measure of husband-wife couples would give a smaller frequency. The results presented in Table 6 indicate that only 4% of migrant households supplied couples. Compared to the 16% of households that supplied migrant husbands, a more accurate measure of couples would further justify implication (3). Thus, husband-wife migration is not more likely than migrant husbands (without their spouse).

I have shown that extended families are an important feature in Nepal and that husband-wife migrant pairs are not more likely than migrant husbands. It is clear from the descriptive results that migration within an extended family occurs frequently, that migration is based on private calculus, and tied-movers (i.e., migrant husband-wife pairs) are not as common as migrant husbands within the extended family framework of Nepal.

### Regression analysis

Household wealth, location, age, gender and education level of the household head, stage of the family life cycle and presence of extended family members are factors influencing migration of household members. Further, the characteristics of the migrant, such as location of migration, age at migration, gender of the migrant and years elapsed since migration are determinants of the migration decision. The thematic discussion of this study has been to infer the relevance of the extended family dynamic in the context of the migration decision. Within the regression framework I show that migrant husbands (relative to migrant husband-wife and non-migrant households) are significantly more likely to be selected from extended families than non-extended ones. Migrant husbands (without their spouse) are about 3.5 times more likely to be from a household with an extended family member present than without. This finding satisfies the implication that wives become untied to their spouses’ decision to migrate in the presence of an extended family member. I also show that migrant husbands are more

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8 The measure of couples used here would include a brother/sister pair, unmarried couples, mother/son, father/daughter, etc.

| Number of migrant pairs | Migrant pairs |
|-------------------------|--------------|
|                         | Count        | Percent  |
| 0                       | 20,914       | 95.65    |
| 1                       | 888          | 4.06     |
| 2                       | 55           | 0.25     |
| 3                       | 8            | 0.04     |
| 4                       | 1            | 0.00     |
| Total                   | 21,866       | 100.00   |

Pairs are defined as male-female migrants at least 18 years of age and migrated to the same destination.
likely from households that are poorer, female headed and the head is younger. The empirical model to estimate is a logistic regression of the form

$$Y = 1(X'\gamma + E\alpha + \epsilon > 0)$$

where $Y$ is a dummy variable for a migrant husband (relative to migrant husband-wife pairs and non-migrant households) such that $Y = 1$ is a household in which the husband has migrated (without his wife) and $Y = 0$ is either a non-migrant household or husband-wife migration. $E$ is a dummy variable indicating the presence of the extended family member, $X$ is the set of observable controls and $\epsilon$ is the model error. Summary statistics for all the variables used in the regression models are provided in Table 7.

Extended families are defined as households with the presence of in-laws, grandparents, grandchildren, brother/sisters and/or other relatives. The nuclear family (or non-extended families) are households that do not include these persons. The regression results are restricted to the subset of (1) migrant husbands defined by the presence of a child at least 5 years of age in the sending household (see the logic presented in Fig. 1 in Online Appendix), (2) households with at least one child under 5 years of age that supplied no migrants, and (3) husband-wife migrant sending households with at least one child under 5 years of age living with their parents. The results of this paper are incomplete due to data limitations and does not generalize to families without children. The presence of children increases the likelihood of migration and has a differential impact on women relative to men. Women become tied to staying in the home country while men migrate. The restriction to children under 5 years does not pose a major problem to the research question because I am interested in identifying an

| Table 7  | Summary statistics of the variables used in the regression model |
|----------|---------------------------------------------------------------|
| Variables | Count  | Mean  | SD    |
| Age of household head | 21,866 | 45.4  | 15.0  |
| Wealth index | 21,866 | 0.00021 | 0.99  |
| Earthquake | 21,866 | 0.0060 | 0.021 |
| Migrant husband | 21,866 | 0.16  | 0.37  |
| District average household size | 21,866 | 4.52  | 0.51  |
| Male headed | 21,866 | 0.70  | 0.46  |
| Age of oldest child | 21,866 | 14.5  | 11.1  |
| Age at migration of oldest migrant | 21,866 | 13.1  | 14.9  |
| Extended family | 21,866 | 0.45  | 0.50  |
| Rural | 21,866 | 0.54  | 0.50  |
| Education level of head: incomplete primary | 21,844 | 0.16  | 0.37  |
| Education level of head: primary | 21,844 | 0.067 | 0.25  |
| Education level of head: incomplete secondary | 21,844 | 0.18  | 0.39  |
| Education level of head: secondary | 21,844 | 0.082 | 0.27  |
| Education level of head: higher | 21,844 | 0.10  | 0.30  |
independent effect of the presence of an extended family member on migrant husbands. Moreover, the relative impact of children is minimized because the base category (or omitted group) migrant and non-migrant households are selected for children under the age of 5 years as well. However, the restriction does exacerbate the endogeneity problem in which the presence of children under 5 years of age influences the creation of extended families in the migration decision.

I present odds ratios of the logistic regression framework to study the implications of household characteristics. To be completely robust in the analysis I
present the logistic regression results in sub-samples. Considering the fact that migrant households may differ by years since migration I run separate regression for those households that supplied migrants “less than one year” ago, “less than five years” ago, “less than ten years” ago and “5-10 years” ago. The results from the shorter sub-samples limit the impact of remittances but will also include seasonal migrants. The results from the longer sub-samples are affected by remittances but migration is less likely to be seasonal or temporary. The results of the regressions are provided in Table 8.

On 25th April 2015 an earthquake of magnitude 7.8 hit Nepal. About 9,000 people lost their lives, 22,000 were injured, and 3.5 million were displaced and homeless. Out of the 35 districts that were affected by the earthquake, 14 districts were impacted most severely (Nepal Ministry of Health and The DHS Program 2016). The effects of the earthquake are controlled for by including the district share of all fully damaged private homes in 2016.

There is potential endogeneity in the relationship between wealth and likelihood of migration. This occurs through remittances that are not explicitly captured in the DHS. Remittances have been proven to be a great source of income and development for households and villages in Nepal and these are captured by the wealth index. Remittances are the main pull factor leading the supply of migrant members to India and other countries such as United Arab Emirates, Saudi Arabia, Qatar, and Malaysia. Seddon et al. (1998) find that the value of remittances from outside South Asia, although a small share of total remittances, are worth far more than those from India and within Nepal. There has been decreasing relevance of India as a destination for remittances: 32.9% in 1995/96, 23.2% in 2003/04, to 11.3% in 2010/11; Nepalis are opting for better paying destinations outside of India and Nepal. That being said, although the share of remittances from India had decreased, the volume of remittances in real terms had increased: NPR 1355 million in 1991/92 to NPR 12,100 million in 2005/06 (Sharma and Thapa 2013). The wealth index indirectly captures total wealth such as income (formal and informal), inheritances, savings, as well as remittances. Historical research emphasized differentials in employment opportunities between Nepal and India as a relevant impetus for hill emigration, as was the granting of land entitlements in the 1960s to keep Nepali’s from moving to the Assam region of India. Wage differentials were not seen as important for driving out-migration (Subedi 1991). The complication arises because the wealth index is capturing opportunities for members in the household from staying, and the fact that neither remittances nor opportunities are observed directly. A large wealth index may be due to accumulated remittances from supplying migrants, but an increase in the supply of migrants may be due to fewer opportunities in the poor household

9 The wealth index is a composite measure of a household’s cumulative living standard. It does not directly capture the sources of wealth but indirectly infers them from the quantity and quality of consumption goods in the household. For instance, households that own a color TV are richer than those with a black/white TV. Similarly, those that use tap water are richer than those that use well water. The wealth index falls in line with the relative deprivation hypothesis of Stark and Taylor (1989). Moreover, the wealth index captures non-market activities; a very relevant source of income for households in the developing world (Shields and Shields 1989).
and a risk diversification strategy. To work around the possibility of such omitted variables bias, I estimate by years since migration. The set of estimates for recent migrants, i.e., less than one year since migration, provide conditions under which households send their first member not too long ago to avail of the benefits from remittances; thus, the lack of opportunities is the main driver for migration in this set of regressions. Interestingly, increasing the number of years since migration does not change the regression estimates drastically. Thus, omitted variables bias due to a time dependent process is not a major concern.

The construction of the wealth index differs for rural and urban households. Some goods in the household’s consumption basket differ between urban and rural households and the weighting used to construct the wealth index reflects this. Surprisingly, household wealth does not seem to be a large determinant of husband migration in any of the results presented. That being said, findings in the prior literature on the positive or negative selection of migrants from the sending country population are mostly mixed. Borjas (1987), Chiswick (1999), and Kotorri (2010) find negative selection of migrants from the sending country population households. On the other hand, moderate positive selection from the sending country population was found by Akee (2010), Chiquiar and Hanson (2005), and Lacuesta (2010). Poverty is a constraint to migration since it is generally expensive to migrate (Borjas 1987; Chiswick 1999; Hatton and Williamson 2002). This view is not carried in the case of Nepal-India migration due to open borders and close geographic distance. The lack of significant selection in Nepal-India migration is a new and interesting finding that deserves its own study.

A second endogeneity issue appears in the relationship between extended families and migrant husbands. Namely, the decision to migrate by husbands may induce extended families to form (Desai and Banerji 2008). For instance, a husband from a nuclear household plans to migrate alone but invites his mother or mother-in-law to live with the family in his absence to assist in household duties. The presence of an unobserved confounding variable is the source of bias in the model. In the example described, the omitted variable is household duties which is further exacerbated by the subset restriction to migrant and non-migrant households with children under the age of 5 years. The model is estimated by two-stage residual inclusion (Cai and Small 2011). This approach is ideal because it accounts for omitted variables more completely in the second stage estimation.

An instrumental variables approach is adopted to address the endogeneity problem. I use district-level average household size as exogenous variation in the model. The reasoning is that district-level average household size represents variations in pre-existing cultural norms of family size across districts in Nepal. The presence of extended family members increases flexibility and accommodates changing economic circumstances, such as losing a household member to migration. The reason to extend families is not simply economic but also a taste for extended family arrangements due to non-pecuniary benefits, such as child care

The empirical methodology pursued in Kotorri (2010) is similar to what I have conducted in this paper by studying the characteristics of the household with migrant members.
(Angel and Tienda 1982). District-level average household size should have no effect on the individual migration decision except to affect the decision to extend the family because it is customary to do so. Thus, the migration decision of husbands would require the wife to receive some support which would come from extended family members. The results are displayed in Table 9. Including district average household size as an instrumental variable for the presence of extended family members slightly increases the likelihood of migrant husbands appearing

|                          | ≤ 1 year | ≤ 5 years | ≤ 11 years | 5-11 years |
|--------------------------|----------|-----------|------------|------------|
| Extended family          | 3.476*** | 3.871***  | 3.781***   | 2.572*     |
|                          | (1.087)  | (1.097)   | (0.981)    | (1.095)    |
| Wealth index             | 0.847**  | 0.836**   | 0.827***   | 0.897      |
|                          | (0.0533) | (0.0466)  | (0.0436)   | (0.0757)   |
| Age of oldest child      | 1.000    | 0.998     | 0.999      | 1.010      |
|                          | (0.00615)| (0.00561) | (0.00513)  | (0.00874)  |
| Education level of head: incomplete primary | 0.973 | 0.984 | 1.005 | 0.855 |
|                          | (0.0791) | (0.0729)  | (0.0700)   | (0.107)    |
| Education level of head: primary | 1.112 | 1.141 | 1.141 | 0.973 |
|                          | (0.102)  | (0.101)   | (0.0963)   | (0.150)    |
| Education level of head: incomplete secondary | 1.032 | 0.971 | 1.034 | 0.905 |
|                          | (0.0881) | (0.0767)  | (0.0743)   | (0.0990)   |
| Education level of head: secondary | 1.118 | 1.107 | 1.192 | 0.819 |
|                          | (0.169)  | (0.142)   | (0.133)    | (0.154)    |
| Education level of head: higher | 0.813 | 0.795 | 0.865 | 0.747 |
|                          | (0.129)  | (0.117)   | (0.115)    | (0.134)    |
| Male headed              | 0.177*** | 0.220***  | 0.231***   | 0.165***   |
|                          | (0.0239) | (0.0254)  | (0.0242)   | (0.0266)   |
| Age of household head    | 0.963*** | 0.964***  | 0.965***   | 0.955***   |
|                          | (0.00475)| (0.00424) | (0.00387)  | (0.00598)  |
| Age at migration of oldest migrant | 1.004 | 1.005 | 1.003 | 0.995 |
|                          | (0.00336)| (0.00279) | (0.00253)  | (0.0131)   |
| Earthquake               | 0.000741**| 0.00238** | 0.00413*   | 0.0149     |
|                          | (0.00197)| (0.00525) | (0.00893)  | (0.0481)   |
| Year fixed effects       | Yes      | Yes       | Yes        | Yes        |
| Region fixed effects     | Yes      | Yes       | Yes        | Yes        |
| Destination fixed effects| Yes      | Yes       | Yes        | Yes        |
| Observations             | 12,617   | 14,060    | 14,840     | 11,594     |
| AIC                      | 957.6    | 2373.9    | 2999.1     | – 1029.6   |

Exponentiated coefficients; Standard errors in parentheses

*p < 0.05, **p < 0.01, ***p < 0.001
from extended families. However, the change in the coefficient estimate is not large; it increased from 3.5 to $\approx 4$.

Linkages to the migration system have been proved to be of importance (Root and De Jong 1991). That is, the presence of family/kin at the destination (as opposed to the origin) might be driving the results of this model. The presence of ties at the destination implies a smaller need for familial support so that the husband would consider migrating alone rather than have his wife along with him. These linkages are not captured in the estimation model due to the lack of post-migration characteristics.

The lack of post-migration information constraints the regression results of this paper because I cannot capture individual specific benefits from migration. The effect of individual specific characteristics are important for explaining the motivation for migration of unmarried men and women (Gubhaju and De Jong 2009). Hence the small pseudo-$R^2$ estimates.

Overall, there is evidence that the presence of extended family members does relieve the wife’s tied-ness to the husband’s migration decision. The migration constraints imposed by the nuclear family dynamic are weaker in an extended family.

**Selection on observables and unobservables**

The DHS records a large amount of household characteristics, which were used as controls in the empirical model. However, only a few characteristics of the migrant were included in the survey, so that, the robustness of the effect of extended family members on the likelihood of husband migration might be put into question. There will be selection bias due to unobserved migrant characteristics that are interacting with the extended family variable which would in turn have no significant independent effect on the likelihood of husband migration. For instance, high skill migrants might be more likely to come from extended families and are also more likely to migrate.

This section of the paper performs a robustness check on the selection bias that are bothering the results of the regression analysis. Selection on observables and unobservables is a strategy developed in Altonji et al. (2005a, b) to be able to measure the degree of selection on unobservables by using the degree of selection on observables as a benchmark. This strategy is useful in identifying the extent of omitted variables bias if there is large amounts of hidden migrant information. It serves as a useful quantification tool to judge whether the regression results relating the presence of extended family members and the likelihood of husband migration is robust to inclusion of the unobserved part. I estimate jointly, the bivariate Probit model

\[
E = 1(X'\beta + u > 0) \\
Y = 1(X'\gamma + E\alpha + \epsilon > 0)
\]

where $E$, $Y$ and $X$ are the set of observable variables defined in the previous section. The variables $u$ and $\epsilon$ is the unobserved selection bias. The second equation is the estimated model of the regression analysis and the first equation is the projection of the variable of interest $E$ onto the model observables $X'\gamma$ and unobservables $\epsilon$. The selection model is formalized as
where $\phi_{X'Y}$ and $\phi_\epsilon$ are the observed and unobserved selection terms. The following condition formalizes the idea of “selection on observables is the same as selection on unobservables”

$$\phi_{X'Y} = \phi_\epsilon$$

The derivation of this condition and assumptions are stated in Altonji et al. (2005a, 2005b). An informal characterization of condition 1: the ratio of unobserved selection required to explain the extended family effect is

$$\frac{\hat{\alpha}}{\left(\frac{\sigma_\epsilon^2}{\sigma^2}\right)\left(\mathbb{E}(\hat{\epsilon}|E = 1) - \mathbb{E}(\hat{\epsilon}|E = 0)\right)} \equiv M.$$

If the estimate of this ratio is too high then it is highly unlikely that the unobservables, if they were observed, would explain the entire $E$ effect. The estimate of this ratio is provided in Table 10 below

The estimate of the ratio $M$ indicates that a shift in the unobservables would have to be $\approx 2$ times as large as the shift in the observables to be able to explain away the $E$ effect; but this is too large for practical purposes. So it is unlikely that including more variables to this model would explain away the effect of extended family households on the likelihood of husband migration. Therefore, the estimated relationship between the presence of extended family members and the likelihood of husband migration is robust to the inclusion of unobserved factors.

### Table 10

| Parameter | Value |
|-----------|-------|
| $\hat{\alpha}$ | 1.66 |
| $\sigma_\epsilon^2$ | 0.25 |
| $\sigma^2$ | 0.35 |
| $\mathbb{E}(\hat{\epsilon}|E = 1)$ | 0.74 |
| $\mathbb{E}(\hat{\epsilon}|E = 0)$ | 2.11 |
| $M$ | $-1.73$ |

### Conclusion

The husband-wife model of migration is an appropriate model under certain instances e.g., to characterize migration between/within developed countries. However, it is unrealistic to suppose all migration involves a husband-wife decision. Migration from developing countries is more likely to be from extended families and this type of family structure is proven to be of importance among several developing...
countries around the world (Bongaarts and Zimmer 2002). As was presented in the theoretical model, tied-movers are less likely within the extended family structure and frees up the migration decision within certain situations. The husband-wife model continues to be of relevance to the receiving country if these pairs of migrants do not appear to have extended families in the sending country. Studies that do not account for the family dynamic in the sending country and assume tied-movers are involved in the migration decision of the husband-wife pair may only be observing special cases of the sending country’s family dynamic. In general, the extent of tied-movers will depend on the relevance of the extended family structure in the sending country.

I present evidence to justify the implications of the model using data from Nepal. I show that extended family structures are of importance in Nepal, the dominant motive for migration is based on factors closely related to private incentives, and those normally considered to be tied-movers in the husband-wife model are not as common as migrant husbands within the extended family framework of Nepal. Within a regression framework I show that migrant husbands are ≈ 3.5 times more likely to be supplied to India or within Nepal from extended families than nuclear ones. Using an instrumental variables approach this estimate rises slightly to ≈ 4 times. These results are likely to remain robust to the inclusion of unobserved factors.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s43545-022-00506-5.

Funding The author declares that he/she received no funding for this study.

Data availability The data that support the findings of this study are available from USAID: Demographic and Health Surveys, but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of USAID: Demographic and Health Surveys.

Code availability Code is available upon request.

Declarations

Conflict of interest The author declares that he/she has no conflict of interest.

Ethical approval Not applicable.

Consent to participate Not applicable.

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