Out-Migration and Local Network Structure in Senegal

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Out-migration is a common feature of rural life in the Global South, yet its impact on social networks in origin communities remains underexplored. Using original data on nearly 10,000 households across 145 villages in Senegal, this paper provides descriptive evidence linking household migration status with social network centrality in sending areas. We find that both short-term and long-term migrant households maintain significantly more local social connections than non-migrant households, and are widely perceived as network hubs. This increased connectivity is not solely attributable to economic resources, but appears driven by non-material factors such as access to migration-related information and the social prestige associated with migration. These findings highlight the role of migrant households as influential actors within their home communities and suggest they may be effective targets for interventions aimed at disseminating political or development-related information. By shifting focus from destination to origin-area networks, the paper contributes to a broader understanding of migration's social impacts and informs strategies for policy outreach in rural contexts.

Keywords: Migration, Network Analysis, Household Networks, Senegal

1 Introduction

Out-migration is a prominent phenomenon in rural areas in the Global South. Individual household members typically move to urban centers to earn income, which they partially remit back to their households that remain in rural origin villages. This type of migration is often seasonal or temporary and, if repeated, can become long-term or permanent migration. As households remain in these villages, out-migration can change village dynamics. Migrant households have access to different material and immaterial resources, such as information about social and political aspects beyond village borders, than non-migrant households. A small literature studies the interactive effects of migration with traditional risk-sharing schemes as two, possibly competing, strategies to smooth consumption (Meghir et al. 2022; Morten 2019). However, overall little is known about migration and the structure of village communities despite high rates of migration in many countries of the Global South.

In this paper, we characterize the relationship between out-migration and household networks that reflect different types of resource sharing in origin villages. We map entire village networks of 9,340 households in 145 rural villages in Senegal for four different network types: social networks, general personal advice networks, migration advice and information networks, and whom to talk to for organizing village events. In addition, we collected data on risk sharing in about half of the households. Rural Senegal is a relevant context as it has a strong tradition of internal and external migration (Ba, Bourgoin and Diop 2018) that is predicted to increase as a consequence of slow-onset climate factors (Rigaud et al. 2021).

With these data, we provide descriptive evidence that households with and without migrating members systemically differ in their sending area social ties. We regress a household's social network degree centrality on the household's migration status, controlling for household compositional and socio-economic effects that likely determine both migration status and network size. We do this for different types of migration, most importantly long-term—migration of former household members in the past 10 years—and short-term—migration of household members in the past 12

months—but also distinguish between internal and external migration, the gender of the migrant, and the reason for migrating such as seasonal labor migration. We then provide a conceptual framework of the informational, economic and social functions that connections with migrant households likely fulfill and investigate these empirically. The temporal structure of our data is such that past migration is linked to subsequent network characteristics, but our analysis is correlational and we do not claim to necessarily identify causal effects. Hypotheses that result from the correlational analysis and the conceptual framework offer avenues for future causal research. Moreover, correlational findings can still inform policy in some respects. For example, targeting migrant households for information dissemination because they are likely to be well-connected does not require the former attribute to be a well-identified cause of the latter.

Our results show that migrant households have significantly higher social network degree centrality than non-migrant households. This relationship is entirely driven by migrant households' in-degrees, that is, other households report a connection with migrant households significantly more often than with other households. The social network in-degree centrality is 4% higher for short-term migrant households and 10% higher for long-term migrant households. This latter coefficient is larger than the coefficient of 8% for being in the richest rather than the poorest wealth quartile. The correlations are particularly strong for internal migration, they exist for labor and non-labor migration and for both migrant genders. The additional social ties are mostly with non-family households and, following a homophily analysis by Bhargava et al. (2022), not with other migrant households. These descriptive results suggest that other households seek connections with migrant households and that social connections form broadly across household types, with migrants integrated into diverse community networks rather than clustering with other migrants or relatives.

Given the strong correlation of in-degree centrality with household migration status, we provide a conceptual framework that outlines incentives of other households to connect with migrant households. First, we assess access to migration information – and information more broadly – as a key function that connections with migrant households plausibly serve. We use the same correlational analysis as before and replace the outcome: instead of degree centrality in the social network,

we use degree centrality with respect to the network for migration information and the network for general advice on personal decisions, respectively. Households with long-term migrants are about 5% more likely to be approached for migration-related and non-migration-related information or advice, though short-term migrant households do not exhibit greater degree centrality on these measures. Second, we use data on transfers that households give and receive to examine how migration interacts with risk-sharing. Our descriptive evidence suggests a limited role of economic exchange in explaining the observed elevated social connectivity of migrant households. However, households with long-term migrants report sending significantly lower transfer amounts to other households than non-migrant households at constant transfer probabilities. This is consistent with a partial substitution of risk-sharing with migration. At last, we highlight that prestige and social status is attached to migration in Senegal, and other households may want to associate themselves with that prestige. To assess this, we re-estimate our primary specification using social network degree centrality as an outcome and additionally control for migration information and general advice network degree centrality. The correlation coefficient on long-term migration reduces from 10.0% to 6.9%. Further, we check whether other groups that are likely to be perceived as "high-status" in the community, such as wealthy households and village chief's, also have higher social network in-degree centrality than out-degree centrality. The magnitude of the coefficient for a village chief's household using in-degrees as the outcome is almost three times greater than that for the out-degree outcome. However, the coefficients for households with high values of the asset index do not differ significantly in magnitude between in- and out-degree outcomes, which implies that migration behavior and the social status it confers can generate incentives to forge connections with these households in ways that wealth alone does not.

This paper makes several contributions. First, we present new data on fully mapped in-person social networks in a large number of communities. Such data collection efforts are rare. A sizable share of the networks-related economics literature is based on data gathered in 75 villages in rural Karnataka, India (Banerjee et al. 2013, 2019, 2024; Breza and Chandrasekhar 2019; Breza, Chandrasekhar and Larreguy 2014; Chandrasekhar, Kinnan and Larreguy 2018; Chandrasekhar,

Larreguy and Xandri 2020; Jackson, Rodriguez-Barraquer and Tan 2012). More recently, Beaman et al. (2021) mapped networks in 200 villages in Malawi, and Heß, Jaimovich and Schündeln (2021) did so in 56 communities in Gambia. We move beyond the name-generator designs used in these three cases, in which households provide census data and names of contacts concurrently and these details are later matched, and use a more robust roster-based design, in which each household is visited twice: once to provide census data that is then used to construct digital village rosters, and a second time for the roster-based identification of contacts.[1]

Second, we contribute to a literature that examines the role of information frictions as a barrier to migration (Baseler 2023; Beber and Scacco 2022; Bryan, Chowdhury and Mobarak 2014; Frohnweiler, Beber and Ebert 2024). While our analysis does not speak to the quality of migration information, it shows that households with long-term migrants are sought for migration advice and information and, therefore, these households can potentially act as agents of change in disseminating important migration-related information.

Third, we expand on a literature on the role of destination networks for migration decisions and outcomes. Destinations networks influence destination choices and can improve social and economic integration at destination (Blumenstock, Chi and Tan 2025; Boyd 1989; Massey et al. 1993; Munshi 2003). Our results suggest that origin networks may fulfill similar functions.

Fourth, we contribute to a literature that studies migrants and their origin households as agents of change for political information or social norms (Batista, Seither and Vicente 2019; Beine, Docquier and Schiff 2013; Brzozowski and Coniglio 2024; Chauvet and Mercier 2014; Tuccio and Wahba 2018). While we cannot measure the transmission of political information or social norms directly, our results suggest that migrant households are an important source of information and advice beyond migration-related topics.

Fifth, we contribute to a literature on the joint interaction between migration and participation in informal risk-sharing schemes (Meghir et al. 2022; Morten 2019; Munshi 2020). Our finding that households with long-term migrants transfer lower amounts to other households coheres with

[1]We know of only one study with a similar scope and approach, which focused on health interventions in 32 villages in Honduras (Kim et al. 2015).

the primary insights from this literature that the relationship between migration and informal risk-sharing depends on the riskiness of migration. Namely, long-term migration can be conceptualized as inherently less risky than short-term migration, as it provides households a more stable "exit option" that enables them to contribute less to collective insurance schemes. Short-term migration, on the other hand, can involve year-to-year or season-to-season fluctuation in employment availability and consequently earnings.

Lastly, we contribute to a literature that seeks to understand who the central nodes in a village are in order to target these for disseminating information in time- and resource-constrained settings (Banerjee et al. 2019; Beaman et al. 2021). Our results suggest that migrant households are relatively central nodes to target that can be identified via a brief set of survey items.

The remainder of the paper is structured as follows. Section 2 describes the study context. Section 3 describes our sample and the measurement of networks and migration. Section 4 explains our empirical approach. Section 5 presents the correlations of social network centrality in origin villages with household migrant status. Section 6 outlines a framework for the incentives to generate or maintain social ties with migrant households. Section 7 concludes.

2 Context

We situate our analysis of the relationship between migration status and social networks in Senegal, a lower-middle income country located in West Africa where the population is split approximately evenly across rural and urban areas (Rigaud et al. 2021, 9). Urbanization has to an extent catalyzed shifts away from the agrarian economy and into informal trade and commerce, but agriculture continues to constitute a prominent source of employment (Rigaud et al. 2021, 10). Moreover, broader structural transformation involving the growth of manufacturing and technology sectors remains limited (Rigaud et al. 2021, 12).

Rates of internal and external mobility have historically been high in Senegal (Ba, Bourgoin and Diop 2018; Rigaud et al. 2021). Internal mobility dominates, though the intensity of movements

varies considerably across regions (Rigaud et al. 2021, 14). Data from 2013 highlight that Senegal had close to 1.9 million internal migrants, constituting 14.6% of the population of approximately 13 million at the time (Ndione 2018, 56). Especially among youth in rural areas, limited access to agricultural production factors such as land paired with droughts and land degradation alongside better educational and economic opportunities in cities motivate internal migration (Ba, Bourgoin and Diop 2018; Rigaud et al. 2021).[2] Economic migration is particularly common among males, whereas female migration typically occurs for marriage (Chort, De Vreyer and Zuber 2017).

Short-term circular mobility is a particularly prominent form of internal migration, although it is rarely captured in migration statistics such as those above (Gubert and Blanchard 2024; Lalou and Delaunay 2017). Using Call Detail Records (CDR) from mobile phones of millions of Senegalese adults across the country, Gubert and Blanchard (2024) estimate that 33% of the adult population was involved in one or more migrations of at least 20 days in 2013. In contrast, the rate of long-term migration in the same year was approximately 2% (Gubert and Blanchard 2024, 2). As in other areas in the Sahel and rural contexts in the Global South more broadly, households often rely on these short-term movements to diversify income across markets given the volatility in production and income associated with rain-fed agriculture (Gubert and Blanchard 2024; Morten 2019).[3]

Internal migration occurs primarily but not exclusively from rural areas to cities, with Dakar as the primary destination (Ba, Bourgoin and Diop 2018). Migration to Dakar, Thies, and Touba (in the Diourbel region) (known as the "Dakar-Touba" axis) combined accounts for 75% of internal migration destinations (Ba, Bourgoin and Diop 2018, 19). Most employment in these and other urban centers is constricted to the informal economy.[4] Our survey data (described in Section 3) suggests that common activities among migrants include informal transport (for example, auto or

[2]Most contemporary internal migration occurs for economic reasons, but separatist conflict in Senegal's Casamance region that began in the 1980s also created significant internal displacement (Ndione 2018). The Internal Displacement Monitoring Centre has not reported new displacements since 2012.

[3]Lalou and Delaunay (2017) note that seasonal migration became particularly widespread in Senegal starting in the 1990s when the Senegalese state withdrew from the groundnut sector in response to structural adjustment programs imposed by Bretton Woods institutions. Farmers reliant on groundnuts were forced to diversify their incomes following the halting of seed subsidies, (Lalou and Delaunay 2017, 273).

[4]Employment more broadly is also dominated by the informal sector, with 92% of the work force estimated to be employed in the informal labor market (World Bank 2018, 18).

motorcycle taxi driver) and small scale commerce.

External migration occurs at lower rates, but exerts considerable influence on Senegalese society and the economy. Remittances from the Senegalese diaspora constitute an important income revenue for many households in the country and a considerable share of GDP (Jegen 2020). Further, migration holds an important place in Senegalese society not only because it can offer a means to overcome financial hardship, but also because of a culture that presents migration as an "an almost obligatory rite of passage among young men, and a central part of the everyday lives of the populations" (Mondain and Diagne 2013, 512). Emigration patterns have been primarily directed toward Europe and other African countries (Beauchemin et al. 2018; Jegen 2020). After independence, most migration outside of the continent was to France, however, migration into France has become increasingly restrictive and emigration routes and destinations have diversified to other countries including Italy, Spain, and the USA (Beauchemin et al. 2018; Jegen 2020; Tall and Tandian 2011).

3 Data

3.1 Sample

The data we collected for this study are part of the 2022 Senegal Migration Panel.[5] The sample includes 145 rural villages in Senegal, grouped into three sub-samples: (1) a nationally representative sample of rural villages (35 villages), (2) representative rural samples from three departments: Kaolack, Matam, and Sedhiou (30 villages each), and (3) a set of 10 rural villages in Thies and Diourbel departments that were targeted by the NGO Eclosio for an irrigation intervention and 10 matched villages in the same departments (for a total of 20 villages of this type). Villages were sampled from location-based strata, namely within district for focus departments and within region for the national sample. The sample excludes all urban communes and communes in the Dakar region. It also excludes certain areas bordering the Gambia, Mali, or Guinea for security reasons (specifi-

[5]For additional project details, see https://www.rwi-essen.de/forschung-beratung/weitere/policy-lab-klimawandel-entwicklung-migration/forschungsprojekte/senegal-migration-panel-smp.

cally, the departments of Bignona, Bounkiling, Medina Yoro Foulah, Saraya, Bakel, Salemata, and the district of Fongolembi). National-level representativeness is conditional on these exclusions. Overall, the sampling frame covers 3,082 out of 3,463 rural villages across all regions and 35 of 41 departments outside of Dakar.[6]

We targeted all households in our sample villages for enumeration during face-to-face surveys conducted in July and August 2022 resulting in a dataset of 9,655 households. Surveyors collected information on the demographic characteristics and internal and external migration history of each household member for the previous 12 months using household member rosters. In September and October 2022, survey teams revisited enumerated households to collect network and other household- and individual-level data. At that time, the household head, or another knowledgeable adult if the head was unavailable, and a randomly selected male aged 18-40 completed the network module.[7] This two-step process – full enumeration of village residents first, followed by the identification of network links from the complete village roster – is designed to improve data quality and reliability, a common challenge with network data constructed on the basis of matching names in free-entry text fields. Few studies have been able to deploy the kind of closed-list procedure we use here (Comola and Mendola 2015; Kim et al. 2015), and none to our knowledge at this scale.

3.2 Network formation

We map entire village networks of 9,322 households in 145 villages for four different network types using the following survey questions:

1. Social: "*Who comes by your house regularly?*" and "*Who do you or members of your household regularly visit in the village?*"

[6]Senegal's administrative units are arranged hierarchically such that settlements (*quartiers/villages*) are nested within communes, which in turn are nested within districts (usually referred to as *arrondissement* or denoted as *cav* for *commune/arrondissement/ville*), which combine to form departments, several of which then constitute a region.

[7]The network module questions were asked even if only one of these individuals was available. In some cases, other household members were also present, and we record the total number of household members who were present. We explore the relationship between characteristics of members present for the network enumeration and network outcomes in subsequent sections.

2. Personal advice: "*If you or members of your household had to make a difficult personal decision, whom would you or these household members ask for advice?*"

3. Migration advice or information: "*Who would you or members of your household ask for advice and information about migration?*"

4. Organizing an event: "*If I wanted to organize an event in the village and had to inform people in the village, who should I talk to?*"

In addition, we collected data on risk sharing in just under half of the households (N=3,935). We have information about whether a household is a recipient and sender of transfers and the total amounts received and sent. However, we lack information on who the counterpart recipient or sender was.[8]

For the four network types (social, personal advice, migration advice, and organizing an event), we collect information on links from members of all 9,340 households within villages.[9] Collecting such detailed data helps mitigate inference problems linked to estimating networks using incomplete or sampled network data (Chandrasekhar and Lewis 2011).[10]

We consider the social network to be the broadest network that we measure, which serves various functions including personal advice, migration advice and risk sharing. The event organizing network allows us to identify households with greater "diffusion centrality", following Banerjee et al. (2019). Given that the broad social network is measured in terms of home visits, this assumes that relevant interactions occur in private places rather than in the public, or in public places with

[8]The transfer data was collected about 7 months after the network data was collected to follow up a sample that participated in in-depth interviews in 2022. To generate the smaller sample for these in-depth interviews, households were randomly sampled from the July/August 2022 village census. Within-village household samples were drawn in proportion to village size, and households were stratified based on roster-reported migration experiences among men between 18-40 years old, such that those who have migrated either domestically or internationally in the previous twelve months were under-sampled roughly by a factor of two. Within each stratum, household selection probabilities were proportional to the number of within-household target individuals.

[9]We exclude unreached households across the two data collection rounds. Overall, enumerators reached 9,340 of the 9,655 (96.7%) households successfully surveyed in the first round. We omitted 19 observations due to enumeration errors related to inconsistent characteristics reported for individuals across rounds.

[10]For example, sampled network data can induce non-classical measurement error, consequently biasing estimates of regression coefficients.

people whom they are also meeting in private. For example, gift-giving is unlikely to occur in the public sphere between two households in the Senegalese context. While information may also commonly be passed between villagers in public settings, such as a village meeting, connections that involve home visits are probably still the most likely to be activated. Connections comprised of private home visits likely also send stronger signals about which individuals are connected, especially for the social status function of networks. Observing individuals interact outside of the home may only signal a weak tie, but learning or seeing that they frequent each other's homes sends a signal about a stronger connection.

We use the village as the network boundary and take nodes to be households rather than individuals as the household is the most relevant unit for economic and social decision-making, including members' migration decisions in the rural Senegalese context (Chort and Senne 2013).[11] Using household-level networks assumes that information and resource flows across household units are shared within households. Our other data match the household as the level of aggregation.

We elicit ties by asking respondents to list any applicable individuals outside of their household. There was no maximum number of names that could be listed, other than the total number of village residents. Enumerators digitally recorded each listed contact by selecting the person from a drop-down list of pre-filled detailed roster information. To ensure that the intended person was correctly identified, enumerators worked with respondents to verify the person's gender, age, name of the head of household, the name of the head's spouse(s), and nickname where possible.[12]

Our primary outcome of interest at the household-level is degree centrality, which simply counts a household's direct (first-degree) ties. For a given household i, we measure this based on total degrees, in-degrees and out-degrees: (1) the sum of the number of households that list visiting or hosting members of household i and the number of households that household i lists visiting or hosting (total degrees), (2) the sum of the number of households that list visiting or hosting

[11] This is also in keeping with the approach taken by virtually all studies that have collected data on village social networks.

[12] This information was included in the drop-down list. When the respondent listed a name that was not in the list, enumerators added the name, age, and gender of this individual. This happened in 3% of cases. In cases where individuals listed members of their own household, we drop this self-referential link from the data. Repeated links to the same household within the same question were also dropped.

household i (in-degrees), and (3) the sum of the number of households that household i lists visiting or hosting (out-degrees).[13] Appendix Figure A1 displays the distribution of these measures in the sample and Table 1 provides additional summary statistics.

Table 1 summarizes the degree centrality measures for the four types of networks. For total degree, households have 7.4 social (visiting or hosting) contacts, 2.9 contacts for personal advice, 2.0 contacts for migration information, and they name 2.9 households to talk to when organizing village events on average. The averages for in-degree and out-degree of these measures are about half of the total degree, with in-degree averages being slightly smaller than out-degree averages.

3.3 Migration and household characteristics

We measure migration using two indicators. First, we create an indicator for whether a household has any former members who moved away in the past 10 years and who is not a member of the household anymore, which we define as long-term migration. Second, we construct an indicator capturing whether any household member (excluding long-term migrants) migrated in the previous 12 months for a period of at least four weeks, which we define as short-term migration. The form of migration captured through this indicator most commonly constitutes labor migration from rural to urban areas during agricultural off-seasons. Table A1 in the appendix lists what the most common reasons of migration in the past 12 months were. 74% of males migrate for work (31% for seasonal work), and 27% of women. Among women, the most common type of migration is for marriage reasons (45%). Note that the households' migration behavior temporally precedes the measurement of networks.

Table 1 provides summary statistics for different migration indicators, variables characterizing the network module participants, and other household-level demographic traits. The sample points to relatively high rates of short-term migration; 67% of households had a member migrate within the last 12 months, while 16% of households had a member move long-term within the last ten years. These relative frequencies generally cohere with the findings from studies described above

[13]The total degree measure is undirected and unweighted, so if household i lists household j and j also lists i, this link is exchangeable with one in which only one of the households lists the other.

Table 1: Summary Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Households visited or hosted					
Total degree	9,322	7.40	3.68	0.00	31.00
In-degree	9,322	4.13	3.20	0.00	30.00
Out-degree	9,322	4.22	2.14	0.00	21.00
Personal advice					
Total degree	9,322	2.88	2.03	0.00	18.00
In-degree	9,322	1.52	1.79	0.00	17.00
Out-degree	9,322	1.55	1.03	0.00	9.00
Migration advice or information					
Total degree	9,322	2.04	1.83	0.00	17.00
In-degree	9,322	1.06	1.49	0.00	16.00
Out-degree	9,322	1.08	0.99	0.00	5.00
Whom to talk to for organizing village events					
Total degree	9,322	2.88	3.80	0.00	67.00
In-degree	9,322	1.48	3.72	0.00	67.00
Out-degree	9,322	1.51	1.05	0.00	8.00
Transfers					
Received (yes/no)	3,888	0.60	0.49	0.00	1.00
Received amount	1,604	27,310.79	45,009.78	1.00	1000000.0
Sent (yes/no)	4,050	0.75	0.43	0.00	1.00
Sent amount	2,297	37,574.29	51,405.06	200.00	900000.00
Migration					
Migration past 12 months	9,322	0.67	0.47	0.00	1.00
Internal migration past 12 months	9,322	0.64	0.48	0.00	1.00
External migration past 12 months	9,322	0.14	0.35	0.00	1.00
Permanent migration past 10 years	9,273	0.16	0.37	0.00	1.00
Permanent internal migration past 10 years	9,273	0.13	0.34	0.00	1.00
Permanent OECD migration past 10 years	9,273	0.02	0.15	0.00	1.00
Permanent non-OECD migration past 10 years	9,273	0.02	0.14	0.00	1.00
Other					
Median age	9,320	33.51	8.39	18.00	90.50
HH head education	9,111	0.25	0.43	0.00	1.00
Asset index (PCA)	9,310	0.00	1.31	-2.07	4.36
Male adults in HH	9,322	3.41	2.26	0.00	29.00
Female adults in HH	9,322	3.57	2.28	0.00	34.00
Network respondents	9,300	1.61	0.83	1.00	8.00
Network respondents: Women only	9,243	0.28	0.45	0.00	1.00
Network respondents: Share 65 or older	9,244	0.12	0.32	0.00	1.00
Network respondents: Share migrants	9,244	0.24	0.42	0.00	1.00
Network respondents: HH head	9,244	0.56	0.50	0.00	1.00

Notes: This table presents summary statistics for households with non-missing network measures. Network measures are represented in degrees. *Asset index* is a principal component index using variables recording household radio, tv, smartphone, bike, motorbike, and car ownership.

that find that temporary migration is more prevalent in this context.

4 Empirical strategy

We estimate correlations between household migration status and social network degree, using the following regression specification:

$$Degree_h = \beta_0 + \beta_1 Migration12m_h + \beta_2 Migration10y_h + S_h\beta_3 + X_h\beta_4 + \mu_h + \varepsilon_h v, \qquad (1)$$

where $Degree_h$ is the degree centrality of household h. $Migration12m_h$ and $Migration10y_h$ present household h's migration status in the past 12 months and in the past 10 years. Note that the first migration indicator is based on the migration status of individuals who were a household member at some point in the past 12 months, indicating short-term migration, whereas the latter is asked for individuals who are not part of the household anymore, indicating long-term migration.[14] S_h refers to interview characteristics and the composition of household h, which are both relevant for the measurement of networks. These include the number of individuals who were present for the network module of the survey, the number of male adults in the household, and the number of female adults in the household.[15] μ_h are village fixed effects to control for heterogeneity across

[14] Therefore, the first migration indicator is not just a subset of the latter migration indicator and collinearity is not an issue.

[15] As the number of household members who were present increases, household degree is likely to increase given more members can list their connections. The numbers of male and female adult members help separate the average difference in household degree across migrant and non-migrant households from any differences in social connections that arise due to the mechanical effects of migration on household composition. For example, because migration reduces household size, it reduces the number of people that can initiate connections outside of the household. We also control for the household's median age, as younger adults are more likely to migrate than older adults. If these adults are also likely to be more socially active in the village, their departure may negatively affect the number of connections the household has. In additional robustness checks we also control for the variation in the characteristics of respondents as these may affect the number of and type of connections households list. For example, when migrants themselves are responding, household out-degree may be systematically lower if these individuals simply have fewer connections as a result of being away from the village for longer periods than non-migrants. Relatedly, because women migrate at lower rates, having only female respondents may be associated with more connections given women are more frequently in the village. Conversely, female respondents may have fewer connections due to gendered access to particular households such as local elites or report fewer ties due to norms about the

villages in features that correlate with migration propensity and social network structures such as village size, economic opportunity, proximity to urban areas, or norms toward migration. X_h include the household head's highest level of completed education and an index of household assets to control for socioeconomic background characteristics of household h. ε_{hv} is an error term for household h in village v, clustered at the village level.

In a first step, we only control for S_h and μ_h but not for household background characteristics. β_1 then presents the average within-village difference in household degree between short-term migrant and non-migrant households, conditional on long-term migration status, and β_2 presents the average within-village difference in household degree between long-term migrant and non-migrant households, conditional on short-term migration status. These differences in connectivity between migrant and non-migrant household types could stem from the effects of migration, they could reflect the impact of social ties on households' propensity to migrate, or third confounding factors. To reduce concerns about confounding factors, we add household socioeconomic characteristics in addition to household composition variables in a second step. However, we will not claim causality of our empirical findings and we won't be able to disentangle the directionality of the measured correlations. Instead, in Section 6, we will present a conceptual framework of functions that connections with migrant households fulfill that is in line with the correlational empirical findings.

extent to which women can or should report on household matters in the absence of a male. Finally, whether the household head or other authoritative figures such as elders responded may affect out-degree ties given that other family members are likely to defer to these individuals in their responses, potentially resulting in the ties of the authority figure rather than the entire household being captured. Consequently, we include indicators for whether the household head responded, the share of module respondents over 65, the share of migrant respondents, and whether only women responded to the network module as additional covariates to assess robustness. Appendix Figure A2 presents simple correlations between these network module respondent characteristics and various network measures, and Appendix Table A2 present specifications regressing social network out-degree on these indicators and village-level fixed effects.

5 Migration and household-level networks

Table A15 presents the results for the broad social network. Columns 1 and 2 use logged total degree as an outcome, columns 3 and 4 use logged in-degree, and Columns 5 and 6 use logged out-degree. In columns 1, 3 and 5, the coefficients on the migration indicators represent the correlation between household migration status and degree conditional on village fixed effects and network measurement related variables. Columns 2, 4 and 6 additionally control for household education and wealth as factors that likely determine both migration propensity and network size.

Column 1 shows that both migration types are associated with significantly greater total degree than non-migrant households though the magnitude of this difference varies by migration type. In particular, having a long-term migrant is associated with an approximately 5.2% higher total degree for these households in contrast to 2.3% percent for short-term migrant households. Adding household socioeconomic characteristics in Column 2 reduces these correlations only by a small extent to 4.7% for long-term migration and 2.2% for short-term migration. Columns 3 to 6 show that these correlations are entirely driven by household in-degree. Long-term migrant households are 10.0% more likely to be mentioned as a social connection by other households than non-long-term migrant households. For comparison, this correlation is larger than the 8.0% correlation between being in the richest wealth quartile, rather than the poorest wealth quartile, and social in-degree. The correlation of 4.1% for short-term migrant households is smaller but still considerable and significant. In contrast, long-term and short-term migrant households do not report higher out-degree social connections.

To test the robustness of the measured correlations, we include additional variables for the characteristics of network survey respondents and household composition in Appendix Table A3. These include the share of respondents over 65 years old, whether the household head responded, share of members that migrated in the past 12 months, and whether the respondents included women only. Having a higher share of migrants present for the network module, participation of the household head, and having only female respondents are significantly associated with fewer connections, but

Table 2: Household degree

	Outcome:					
	HHs visited or hosted		Visit/host in-degree		Visit/host out-degree	
	(1)	(2)	(3)	(4)	(5)	(6)
Migration past 12 months	0.025**	0.023**	0.042***	0.041***	0.005	0.004
	(0.011)	(0.011)	(0.016)	(0.015)	(0.011)	(0.012)
Permanent migration past 10 years	0.051***	0.047***	0.115***	0.110***	-0.008	-0.008
	(0.011)	(0.011)	(0.017)	(0.017)	(0.013)	(0.013)
Network respondents	0.059***	0.058***			0.062***	0.062***
	(0.005)	(0.006)			(0.007)	(0.007)
Male adults in HH	0.052***	0.050***	0.090***	0.090***	0.012***	0.011***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)
Female adults in HH	0.028***	0.026***	0.049***	0.047***	0.004**	0.003
	(0.002)	(0.003)	(0.004)	(0.004)	(0.002)	(0.002)
Median age	0.002***	0.002***	0.002**	0.002**	0.000	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
HH head education		0.023**		0.023		0.030***
		(0.010)		(0.015)		(0.011)
2nd Asset quartile (PCA)		0.024*		0.006		0.038***
		(0.012)		(0.020)		(0.012)
3rd Asset quartile (PCA)		0.054***		0.045***		0.040***
		(0.013)		(0.017)		(0.012)
4th Asset quartile (PCA)		0.077***		0.074***		0.058***
		(0.016)		(0.020)		(0.017)
Outcome mean	7.400	7.415	4.133	4.138	4.219	4.231
Outcome SD	3.681	3.679	3.199	3.196	2.138	2.140
Observations	9249	9032	9269	9052	9249	9032
Village FEs	✓	✓	✓	✓	✓	✓

Notes: All specifications estimated using OLS. Standard errors are clustered on village level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

the relationship between household migration status and degree changes minimally with the inclusion of these additional controls. Specifically, the coefficients on migrant status for both types of households remain significant, and the magnitude of the coefficient for short-term migrant household status slightly increases to 3.1% for total degree and 5.1% for in-degree.

5.1 Variation in migration types

In this section, we seek to better understand which types of migration are driving the correlations observed in Table A15, and in particular the weaker link of household degree with short-term migration than with long-term migration.

Short-term migration in the past 12 months reflects a very different type of migration than long-term migration in the past 10 years. First, long-term migration likely includes other, potentially more distant, destinations than short-term migration such as to OECD countries. Second, long-term migration likely includes relatively more migration for marriage reasons of women, as in Senegal's patrilocal society wives move in with their husband's family or to their husband's village, whereas short-term migration includes relatively more seasonal or year-to-year male labor migration as a typical income diversification strategy. Third, long-term labor migration may be a strong signal of successful migration, whereas short-term labor migration includes, to some extent, individuals who engaged in "failed migration". The incentives to seek connections with households of these different migration types or, conversely, the incentives of different migration-typed households to seek connections with other households likely differ. For example, in comparison to households with a long-term labor migrant, households with a short-term labor migrant may provide less financial resources, lower quality information, particularly migration-related advice or information, and less status than those who long-termly migrated for work.

The top panel of Figure 1 presents correlations of household degree with short-term migration split into two indicators, namely internal and external migration in the past 12 months, and long-term migration is split into three indicators, namely internal migration, migration to a OECD country, and migration to a non-OECD country in the past 10 years. For short-term migration, the correlation with total household degree is entirely driven by internal migration (2%, p-value<0.05). The coefficient for external short-term migration is close to zero and even slightly negative. For long-term migration, the effects are strongest for non-OECD external migration in terms of size (5%, p-value<0.1) and for internal migration in terms of significance (4%, p-value<0.01). The coefficient of OECD migration is insignificant.

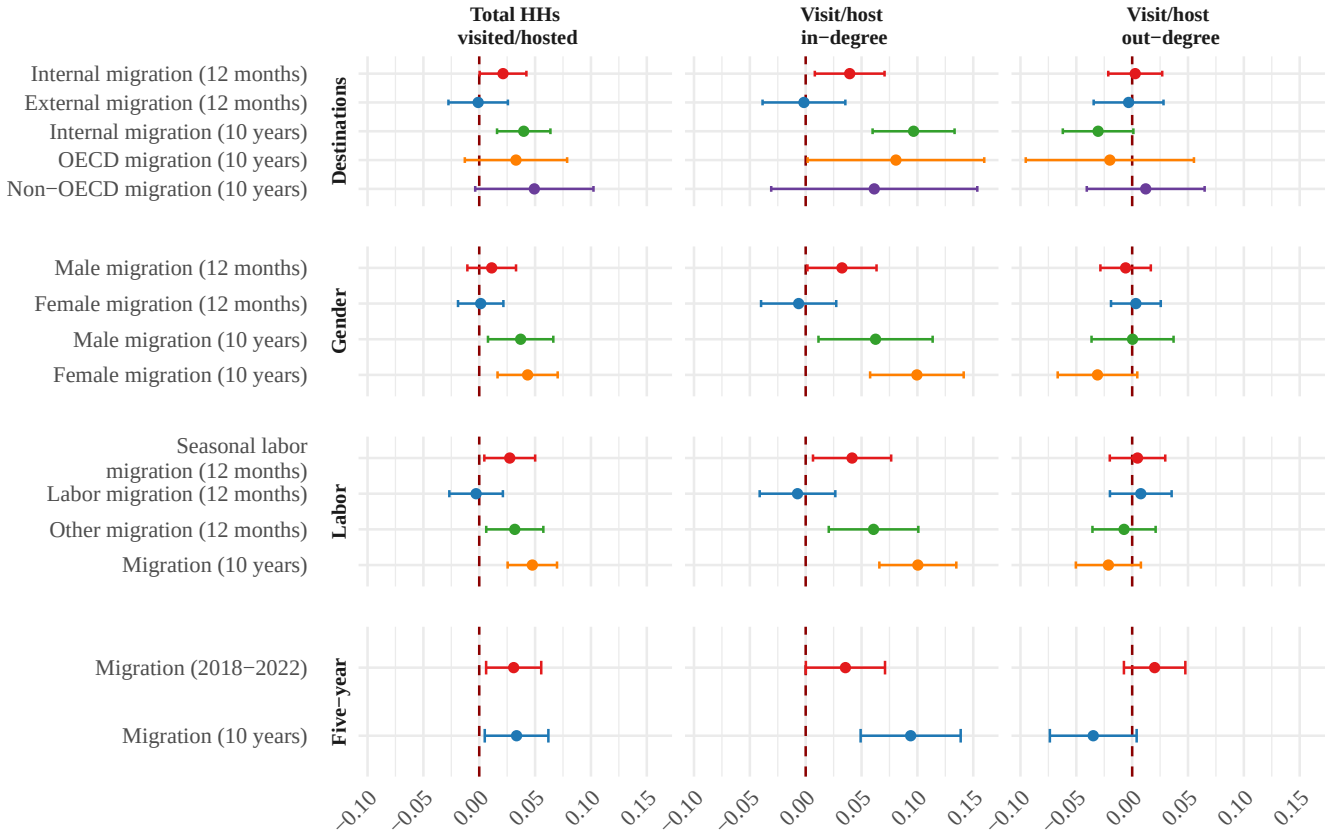

Figure 1: Variation in migration types

Notes: This figure presents the results of four specifications that regress the social network measures (visiting and hosting others) presented in Section 3.2 on various migration indicators. The first (top) panel regresses the network measures on migration indicators disaggregated by destination type for short- and long-term migrants. The second panel includes indicators for whether target individuals (the same sample from whom we collected information on financial transfers) migrated at least once between 2018-2022. The third panel regresses network measures on migration indicators disaggregated by gender for short- and long-term migrants, and the bottom panel disaggregates short-term migration indicators by whether individuals engaged in labor migration and if so, whether migration reasons included finding short-term or permanent work. All specifications use village fixed effects, the full set of covariates described in Section 4 and cluster standard errors at the village-level. The figure presents 95% confidence intervals.

Next, we split the short-term and long-term migration indicators by the gender of the migrant, as females often migrate for marriage reasons and males for labor reasons.[16] The second panel of Figure 1 shows that for short-term migration both the male migrant and female migrant coef-

[16]While we know the reason of migration for short-term migration, we unfortunately do not know the reason for long-term migration.

ficients are small and insignificant, whereas for long-term migration the correlation is around 4% and significant for both genders. Thus, different types of migration associated rather with females or males does not seem to drive the observed correlations.

If perceptions of migration failure are contributing to the weaker association relative to long-term migration, the association between migration and degree should be stronger for forms of migration where return is a systematic feature of the migration episode. The third panel of Figure 1 shows that this is the case. In this table, we split short-term migration into seasonal labor migration—a form of migration in which return is expected, for example, due to seasonal variability in agricultural conditions, rather than an indicator of unsuccessful migration—non-seasonal labor migration and other non-labor migration occurring in the last 12 months. Seasonal labor migration is significantly associated with greater total household degree (3%, p-value$<$ 0.01) while non-seasonal labor migration, which involves migration episodes where individuals intended to search for permanent work, is not.

Lastly, we address the concern that the comparison group contains households that had a short-term migrant who returned in previous years, which could dilute the measured correlation if the relationship with degree persist over multiple years. We use data from individual-level interviews with randomly selected men aged 18-40 within a subset of the sample households and whom were asked detailed information about their migration behavior in the past 5 years rather than 1 year.[17] Appendix Figure A3 displays the distribution of years in the period 2018-2022 for individuals who indicated having any external or internal migration experience. Only approximately 23% of migrants migrated all five of these years, suggesting that households change their migration status across years somewhat frequently. The bottom panel of Figure 1 presents the correlation of household degree with an alternative short-term migration indicator, which is equal to one if the individual reported having migrated at least once between 2018-2022. Using the five-year indicator, the coefficient for short-term migration is robust and slightly larger (3.2%, p-value$<$ 0.01) than the analogous coefficient in Table A15.

[17]The sample is the same that we collected information on transfers for.

5.2 Variation in types of connections

Next, we characterize the types of connections migrants are more likely to have. Appendix Table A4 presents results from specifications that exclude non-household family ties and shows that the results in Table A15 are not driven by these family ties for long-term migration households. For short-term migration, the now smaller coefficients are insignificant for total degree but remain marginally significant for in-degree (2.9%, p-value$<$ 0.1), reinforcing the stronger relationship between long-term migrant status and degree.

Further, migrant households' social ties do not consist primarily of ties with other migrant households. In Appendix Figure A4, we analyze homophily patterns among households, following the methodology of Bhargava et al. (2022). The methodology uses dyadic data and regresses an indicator for whether there is a tie between two households on variables indicating whether these two households share the same characteristics such as being a migrant household or their wealth status, and controlling for sender and receiver fixed effects. Positive coefficients indicate homophily. In Appendix Section A.1.2, we present the estimation specification and describe the method in detail. Our findings indicate that while migrant households show some tendency to connect with similar households, these homophily effects are rather modest. Households with recent internal migrants (past 12 months) are only 0.5 percentage points more likely to connect with other internal migrant households than non-migrant households, while households with long-term migrants are 0.8 percentage points more likely to connect to other households with long-term migrants. We also consider homophily for the more disaggregated migration types discussed in the previous section. We observe the strongest migration-related homophily among long-term migrants to OECD countries, but even there the effect remains relatively modest, with shared status increasing connection probability by 2.5 percentage points.

Finally, we follow Banerjee et al. (2019) and elicit households with greater "diffusion centrality" within a village using the question "*If I wanted to organize an event in the village and had to inform people in the village, who should I talk to?*" Responses to this question allow us to measure who is perceived as well connected in the village. Appendix Table A5 shows that

long-term migrant households have significantly higher degrees for this outcome measure (6.8%, p-value$<$ 0.01). We compare the diffusion centrality of migrant households to that of village chiefs by adding an indicator for whether the household is that of the village to the model.[18] Village chiefs wield considerable social and political authority at the local level (Wilfahrt 2018) and we would expect them to have high diffusion centrality. Indeed their coefficient is very large and significant (235%,p-value$<$ 0.01), about 21 times as large as those of long-term migrant households.

These results suggest that migration networks extend beyond narrowly defined family or migrant circles. Social connections form broadly across household types, with migrants integrated into diverse community networks rather than clustering exclusively with other migrants or relatives.

6 Network functions

Having established an overall positive correlation between migrant households and degree centrality that is driven by migrant households' in-degree, we explore the extent to which migrant households serve useful functions that incentivize other households to seek connections with migrant households. Also note that the migration behavior temporally precedes the measurement of networks. However, given the observational nature of our data, we cannot exclude the possibility that social ties influence migration status, and we briefly discuss the potential pathways through which they are likely to do so in Section 6.3.

6.1 Framework

Social networks serve varied functions. Our discussion focuses on incentives to connect with migrant households linked to the resources, material or immaterial, that they can provide as a result of their migration status. We outline a framework focusing on three functions—information, access to financial resources, and social status—social networks fulfill that are likely relevant for under-

[18]The lower sample sizes in Appendix Table A5 relative to Table A15 reflect missingness in certain villages for the village-chief household indicator.

standing the relationship between migration and origin-area social networks. For each function, we discuss whether and if so how it likely differs across connections among migrant households and connections between migrant and non-migrant households. While the framework isolates these functions for which connections with migrant households may be especially important, we consider these as neither all-encompassing nor mutually exclusive.[19]

Information capital

Migration behavior and social connectivity may be linked via an information transmission channel. The notion that social networks generate "information capital"—the ability to acquire valuable information and/or spread it to others through social connections (Jackson 2020, 4)— is widespread (Banerjee et al. 2019; Jackson 2020), and an extensive literature studies the role that social networks in destination areas play in providing such capital to shape migration intentions, behavior, and integration outcomes (Banerjee 1983; Böcker 1994; Boyd 1989; Faist 2021; Fawcett 1989; Haug 2008; Massey and España 1987; Toney 1978; Wilpert 1992). More tangibly, this information capital can help reduce uncertainty about conditions in the destination including wage expectations, information about potential employment, and how to cross borders, whether internal or external. Thus, migration behavior and destination networks are often positively related, as the more social relations one has at the place of destination, the more migration-related information these relationships provide (Coombs 1978, 262)(Haug 2008, 589).[20]

Origin social networks' role in diffusing migration-related information is relatively less studied, but ties at home can also influence how and which information circulates. In particular, in contexts where migration is predominantly temporary or return migration is common, such as seasonal urban-to-rural migration, returning migrants can directly provide relevant information about

[19]We borrow this language from Cruz, Larreguy and Marshall (2019)'s characterization of their framework for understanding social networks' functions for shaping politics.

[20]As Blumenstock, Chi and Tan (2025) note, the prevailing view in migration literature, connections in a particular destination may not always spur migration to that destination. Tougher competition for jobs and other resources can create a deterring effect of networks (Beaman 2012; Calvó-Armengol 2004; Calvo-Armengol and Jackson 2004; Wahba and Zenou 2005), and Blumenstock, Chi and Tan (2025) find that while migrants are more likely to migrate to destinations where their social networks are interconnected, they are no more likely to migrate to destinations where their networks are extensive.

destination conditions (Chen 2022). When a household member migrates long-term, others may indirectly obtain information about their migration experience and conditions at a particular destination from the household members who remain. In these contexts, household migration status and the number of its social ties are likely positively correlated. While incentives to cultivate ties with migrant households to access such information may be strongest among non-migrant households given their lack of direct access to household members with this information, these incentives may also be salient for households with existing migrant members. For example, migrant households may wish to learn about other destinations or migrant households may simply wish to learn from each others experiences.

Beyond migration-related information, migrant households may be important for the diffusion of political information. Because of their links to individuals outside of the village, these households possess an increased information set about political processes and events occurring outside the origin area (Batista, Seither and Vicente 2019), and members of non-migrant households may seek to establish connections or maintain frequent contact with these households to access this information. Though studies predominantly focus on the effects of international migration on political information diffusion and its implications,[21] internal migrants can also spread relevant information, such as perceptions people outside the origin area hold of different political candidates or information about the provision of public goods and services in other regions.[22] Further, even if migrant households do not actually spread politically-relevant information, the mere fact they have access to it can influence local authorities' incentives to connect with these households. For example, they may seek to cultivate strong ties with these residents as a way of preventing information about them or their preferred candidates that could challenge their authority from diffusing widely.

More broadly, if migrant households enjoy a higher status in the community (see function social status below), their views on or advice about aspects unrelated to migration or politics may be

[21] See Kapur (2014) and Ivlevs (2021) for an overview.

[22] In fact, the potential to disseminate politically relevant information may be higher for internal versus external migrants. For example, Goodman and Hiskey (2008) argue that many immigrant communities have little exposure to host countries' political institutions. However, households with external migrants may still have overall greater information than non-migrant households.

valued and thus sought.

Access to financial resources

Economic functions relate to migrant households' connectivity in complex ways. In rural areas in developing contexts, households face high-income volatility across seasons and years due to weather-dependent agricultural activities. Two important strategies to cope with this volatility are migration and risk-sharing schemes. A growing literature examines how migration and risk-sharing schemes interact to affect incentives to participate in each (Meghir et al. 2022; Morten 2019; Munshi 2020; Munshi and Rosenzweig 2016).

Because participating in informal risk-sharing requires having substantial origin network ties, the relationship between migration and overall social connectivity in origin areas may be at least partially driven by the specific interaction between social insurance and migration. While both migrant and non-migrant households may have incentives to participate in risk-sharing schemes with migrant households when these households have on-average higher incomes, migrant households' decisions to participate likely depend on the riskiness of migration. When migration is relatively costly and risky, migration and social insurance may be characterized by a positive equilibrium relationship (Meghir et al. 2022). The riskiness of the migration and expectations about future average earnings may incentivize migrant households to join or remain in risk-sharing schemes in exchange for the benefit of a potentially large return that can facilitate future migration (Meghir et al. 2022). In contrast, when migration and participation in local risk-sharing are substitutes, which is likely when migration-related costs and risks are low (Meghir et al. 2022), migrant household status and social ties may be negatively correlated. Migration can weaken post-migration incentives to participate in such income schemes because of the exit option migration provides, implying migrant households likely exhibit weaker connectivity relative to non-migrant households.[23] Finally, if migrant households have greater access to resources, which is more likely the case for long-term

[23]Importantly, for both forms of migration, social connectivity and participation in informal insurance schemes may be important for understanding initial selection into migration. When migration is risky, social ties can facilitate access to resources to enable migration in the first place. In other cases when migration is not so risky, households without access to such social safety nets may be more likely than those without them to use the migration option to diversify income (Meghir et al. 2022).

migration in contexts where short-term seasonal migration is used as a strategy to smooth consumption, other households likely seek to have migrant households in their risk-sharing network.

Social status

Finally, migration often enhances migrants' and their households' social prestige and influence, and migrants' greater connectivity in origin areas may reflect others' incentives to associate themselves with this prestige. For example, in certain contexts, migrant households often display distinct consumption patterns, such as the construction of large houses or other displays of wealth that express upward social mobility (De Haas 2007). However, prestige is not always solely acquired through economic success. In Senegal in particular, a pervasive "culture of migration" celebrates migration and migrants and influences how they are perceived by their families and communities more broadly (Nyamnjoh 2010; Prothmann 2018). As Riccio et al. (2005) state, migrants are often viewed as heroes because of "the efforts they undertake for the well being of their families despite being far from home" (Riccio et al. 2005, 106), and this culture of reverence is visible in different domains of contemporary society (Riccio et al. 2005). Migrant households in this context may thus occupy central positions in social networks, reflecting non-migrant households' incentives to strategically cultivate these connections to access this status or other migrant households' incentives to establish social ties through which their status can be maintained.

6.2 Empirical exploration

6.2.1 Information

We first turn to the role of information. As described in Section 6.1, households with migrants are likely to have better access to information beyond the village, and diffusion of this information may be one function of ties with these households. This should be the case in particular with respect to migration-related information. To examine whether this is the case, we replicate our main specifications but replace the outcome with another question included in the network module: "*Who would you or members of your household ask for advice and information about migration?*"

Row 1 of Figure 2 presents the coefficients for both types of migration for this specification along with the coefficients for the social network of hosting and visiting other households in Row 4. Long-term migrants have significantly higher degrees for migration advice, and Appendix Table A6 shows that this result is driven by migrant households' in-degree, which confirms that migrant households are more likely to be approached for migration advice than non-migrant households. Figure 2 also shows that long-term migrant households exhibit greater degree centrality in general advice on personal decision networks (Row 2), which is consistent with migrants' overall higher information or social capital.

Figure 2 presents these correlations once controlling for the socioeconomic covariates of household asset quartile and the head's education. The change in correlations from including those variables is small, suggesting that these correlation are not purely driven by socioeconomic factors.

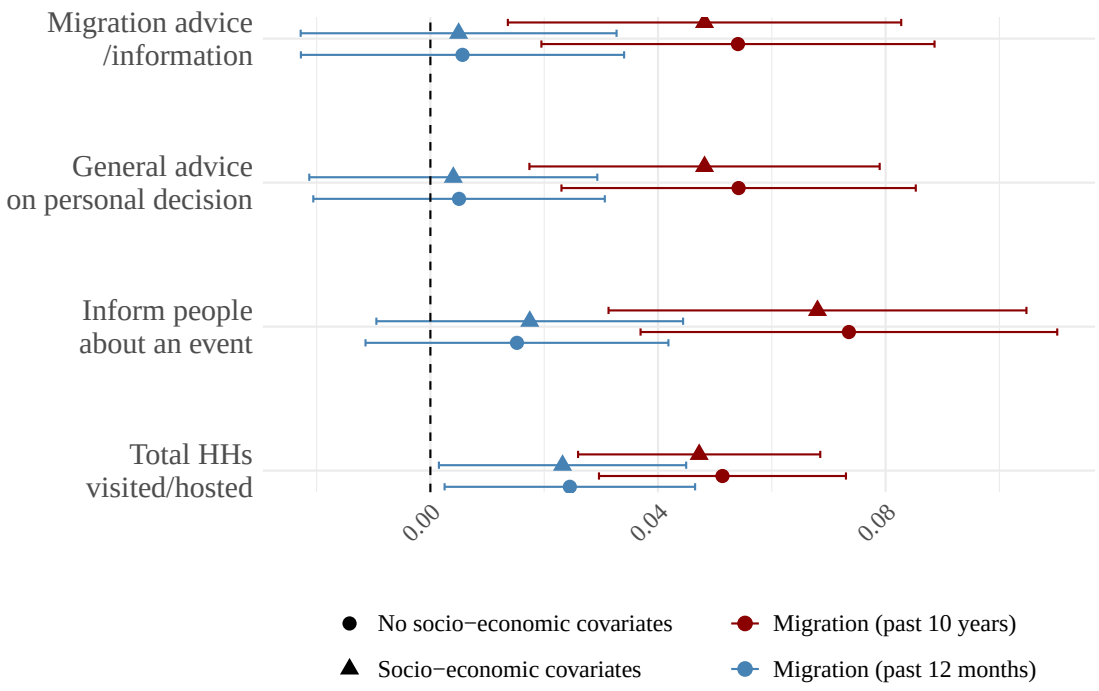

Figure 2: Household degree with alternative network outcomes

This figure plots coefficients for the migration household indicators using specifications in Columns 2 and 3 of Table A15, as well as analogous specifications that use the logged degree of alternative network measures outcomes.

6.2.2 Access to financial resources

Next, we evaluate the degree to which migrant households' network positions are correlated with risk-sharing. Namely, migrant households' greater connectivity may reflect incentives to remain in risk-sharing schemes, and thus remain well-connected, or other households incentives to seek risk-sharing networks with potentially more resourceful migrant households. As discussed before, we are unable to disentangle this directionality. To assess this, we examine the correlation between migration status and participation in risk-sharing, measured as giving and receiving within-village transfers. We use data on these outcomes from a follow-up phone survey conducted between April-June 2023 with a sample of randomly selected men aged 18-40 described in Section 3.2.

Appendix Table **??** shows that engagement in within-village risk-sharing systems differs across migrant household types. Short-term migrants report giving, but not receiving, transfers more frequently than non-migrant households, though this difference is weakly significant, while long-term migrant households engage at similar rates as non-migrant households but, conditional on giving, they report giving smaller amounts. These contrasting relationships between short-term and long-term migration may link to the relative riskiness of migration. For example, short-term migration entails recurring uncertainty linked to the search for work, while households with a long-term migrant can rely on an established outside source of income, which can depress incentives to send (high) transfers as there is little need for these to be reciprocated in the future. The fact that long-term migrant households still display greater overall connectivity suggests that the risk-sharing function likely plays a muted role in explaining these households' network positions.

Outside of risk-sharing, the degree to which migrants' economic resources correlate with their network positions also appears limited. Columns 2, 4, and 6 of Table A15 show that the inclusion of a household-level asset quartiles does not significantly affect the relationship between migration status and household degree. This is also the case when using quartiles based on an alternative wealth measure based on the Simple Poverty Scorecard project for Senegal (Schreiner 2017), as shown in Appendix Table A8.

6.2.3 Social status

Our final network function invokes incentives to connect with migrant households to access (in the case of non-migrant households) or maintain (in the case of migrant households) the prestige and influence that migrant households in this context possess, even if these connections do not provide greater access to material resources. We evaluate evidence for whether this function is likely salient by assessing the degree to which migrants' greater connectivity is driven by other households seeking connections with these households.

In a first step, we assess this by comparing migrant households' social in- and out-degrees when including migration information degree and personal advice degree as additional predictors. Appendix Table A9 presents the results of this specification. The social network in-degree and out-degree is positively correlated with migration advice and general advice in-degrees and out-degrees. The correlation between these network types is much stronger for in-degrees than out-degrees and, in particular, for the correlation of social in-degree with general advice in-degree (47.4%, p-value$<$ 0.01). The significant and positive association between migrant household indicators and social in-degree centrality reduces to a smaller but still substantial correlation of 3.8% (p-value$<$ 0.01) for short-term migration and 6.9% (p-value$<$ 0.01) for long-term migration. In contrast, for social out-degrees the correlation with short-term migration status is zero, and even negative (2.8%) and marginally significant for long-term migration.

We also check whether this discrepancy between the magnitude of in- and out-degrees applies to other groups that are likely to be perceived as "high-status" in the community, such as wealthy households and local elites. As mentioned above, village chiefs are prominent local elites in the rural Senegalese context, and thus likely represent a "most-likely" case of high-status households. Appendix Table A10 presents results from the same specifications as those in Table A15 but also include an indicator for the village chief's household. The magnitude of the coefficient for a village chief's household using in-degrees as the outcome is almost three times greater than that for the out-degree outcome, which indicates that the asymmetry between households' contacts listed and the number of households that list the household may be a relevant metric for assessing social

status in this context. However, the coefficients for households with high values of the asset index do not differ significantly in magnitude between in- and out-degree outcomes, suggesting that the incentives to form social connections based on households' wealth operate differently than those based on households' migration or local authority status.

Given that village chiefs exercise considerable authority in rural areas, we assess whether migrant households are more likely to be connected to these local elites as an additional indicator of their social status in origin villages. Appendix Table A11 presents results regressing connections to the chief on migration status and other household-level variables. Conditional on these additional covariates, long-term migrant households are only 1.1% more likely, and only marginally significantly so, to be mentioned by a village chief as a social contact. However, there is a also little evidence that this is because migrants' increased social influence and centrality within origin networks is associated with parallel authorities. In fact, households with long-term migrants are 1.8% (p-value$<$ 0.05) more likely to list village chief households as connections.

6.3 Discussion

Overall, the descriptive analyses in this section suggest that incentives to gain access to information and social capital shape migrants' connectivity at origin more than access to economic resources. They also suggest that the same holds for non-migrant households seeking connections with migrant households, given the important role played by migrant households' in-degree rather than out-degree connections, which is in our book indicative of the information and social status mechanisms.

One implication of the claim that non-migrant households seek out ties with migrant households due to their greater access to information and social capital is that as out-migration rates increase, these incentives should wane. As more households send migrants abroad or to other areas in Senegal, they gain access to the benefits that connections to migrant households would otherwise provide.

To see if we can observe this kind of sensitivity to the overall prevalence of migrant house-

holds, we explore how our main results differ by village-level migration rates. Appendix Table A12 shows that the positive and significant relationship between migration status and degree centrality is indeed the strongest in villages with below-median migration rates. While even in villages with above-median long-term migration rates, long-term migrant households are more connected – perhaps because they still only constitute a relatively small portion of all households – the coefficient for the indicator of whether a household has a long-term migrant is largest in villages with low rates of both forms of migration.[24]

We conclude our empirical analysis with a note of caution. We have primarily focused on the relationship between migration and social networks via the effects that migration can have on social networks, in particular as migrant households gain access to select resources. The positive correlation observed between household migration status and connectivity, however, may also reflect mechanisms through which connectivity alters migration behavior. For example, those who are already strongly embedded in their origin communities may be more likely to have access to information that can facilitate migration. And while our data suggest that information- and status-optimizing households seek connections with migrant households, our data do not allow us to adjudicate whether the households seeking these resources form these connections with migrant households because of these resources, or whether these existing ties simply facilitate this type of resource transmission.

7 Conclusion

How social networks shape migration patterns and integration outcomes is extensively studied across social science disciplines, but the focus is predominantly cast on destination-area social networks. We shift attention to social networks in sending areas and descriptively document how out-migration correlates with network structures. Our analyses of conditional correlations between

[24]Villages with high rates of only one form of migration constitute a much smaller share of the total sample. Appendix Table A13 provides sample sizes and summary statistics on migration rates across village types.

household migration status and degree point to significant differences in migrant and non-migrant households in the number of social ties these households maintain in origin areas. In particular, households with migrants have greater degree centrality than non-migrant households, and households with long-term migrants are widely perceived as central nodes in origin-area social networks. Moreover, these households occupy central positions in advice networks, including those in which migration-related advice or information is exchanged.

Our descriptive data naturally limit us from assessing causal relationships between migration and social networks. As discussed, migrant households' increased connectivity may be an effect of migration or may reflect their pre-migration characteristics, and our analyses do not distinguish between these. An important extension of the findings will be to estimate the causal relationship between migration and social connectivity and the mechanisms that underpin it. Understanding these causal links will be particularly important for making assessments about the welfare benefits of policies that promote migration, given that social networks in rural settings can provide varied functions and benefits to their members.

Finally, the paper raises questions about the implications of migrants' greater degree centrality in sending areas for downstream political outcomes. Our findings suggest that though migrant households may be particularly well-placed to access and spread political information that non-migrant households may not have access to, it remains to be tested whether these households diffuse or leverage information in ways that significantly challenge existing political hierarchies or affect electoral accountability. In particular, given that long-term migrant households are more likely to seek ties with village chiefs, they might limit information flows or otherwise influence political participation of residents in ways favorable to these elites. Answering how and when migrant households do so will be critical for understanding the conditions under which exit and voice interact to either consolidate or weaken existing authority structures.

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A Appendix

Contents

A.1 Additional results and summary statistics

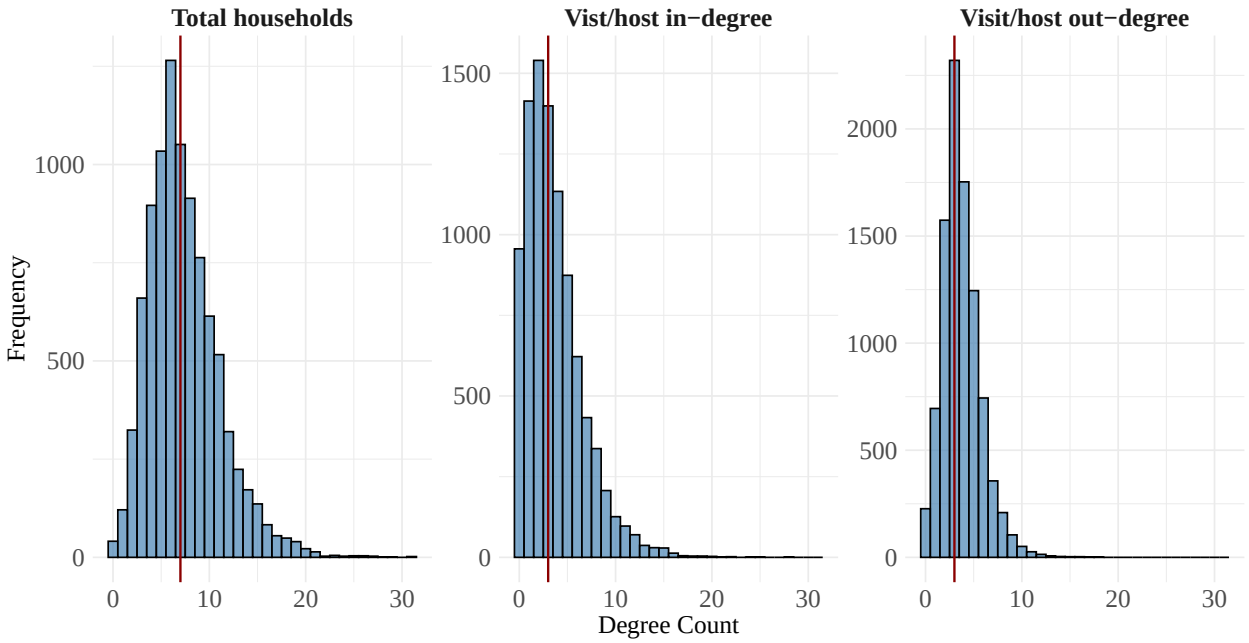

Figure A1: Distribution of degree measures

Notes: This figure presents the distribution of households' total, in-, and out-degrees for the questions "Who comes by your house regularly" and "Who do you or members of your household visit regularly?"

Table A1: Distribution of short-term migrants by gender and migration reason

	Female		Male		Total	
Reason	Stock	Percent	Stock	Percent	Stock	Percent
Labor (non-seasonal)	760	16.6	4709	45.5	5469	36.6
Labor (seasonal)	547	12.0	3426	33.1	3973	26.6
Marriage	2168	47.4	543	5.2	2711	18.2
Education	722	15.8	1392	13.4	2114	14.2
Other	453	9.9	683	6.6	1136	7.6
None	42	0.9	39	0.4	81	0.5
Covid	1	0.0	3	0.0	4	0.0
Governance	1	0.0	0	0.0	1	0.0
Violence	3	0.1	2	0.0	5	0.0

Notes: This table presents the distribution of short-term migrants by gender and migration reason. "Percent" columns present the percentage of individuals migrating for a given reason among all migrants of that gender. Multiple migration reasons could be selected for a given migration episode thus percentages do not sum to 100.

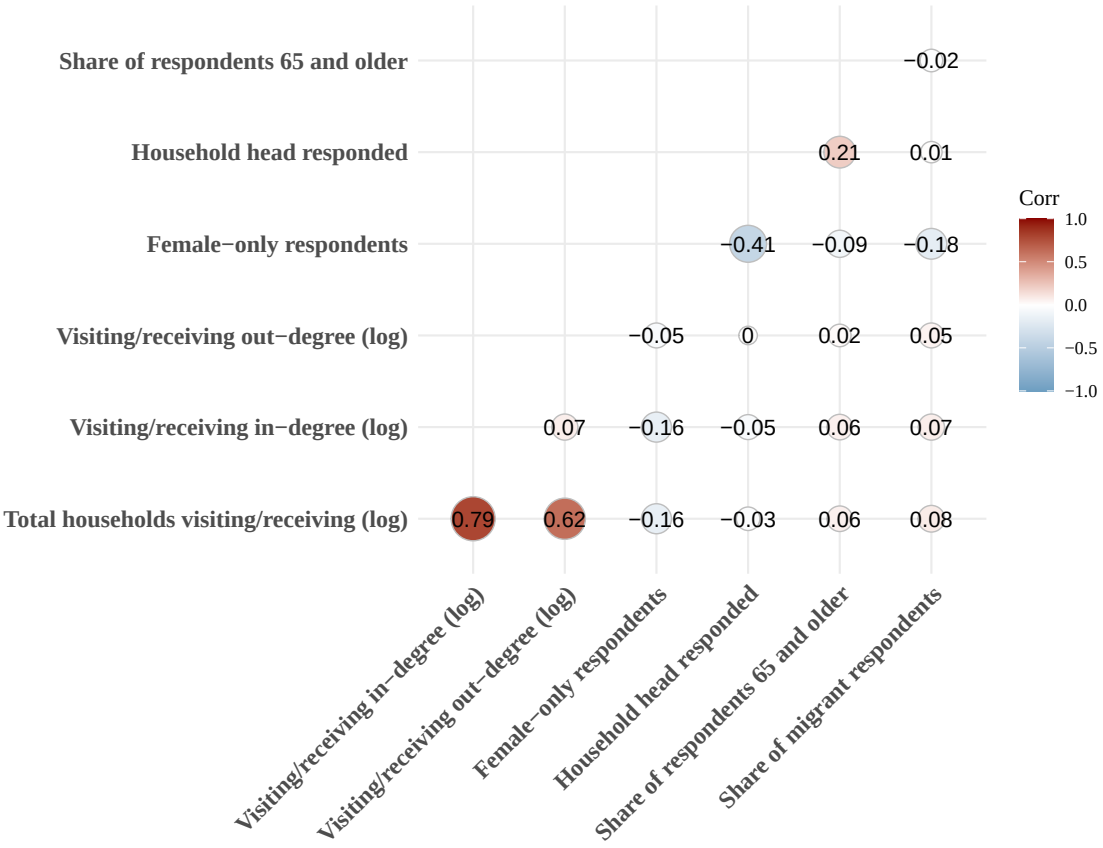

Figure A2: Correlations between density measures and network respondent characteristics

Notes: This table presents correlations among the variables related to the characteristics of the network module respondents and the social network measures. Summary statistics for these variables are presented in Table 1.

Table A2: Network respondent characteristics and density (out-degree)

	Outcome: Visiting/receiving out-degree (log)				
	(1)	(2)	(3)	(4)	(5)
Network respondents: Share 65 or older	0.027**				
	(0.013)				
Network respondents: Share migrants		0.028**			
		(0.012)			
Network respondents: Women only			-0.076***		
			(0.011)		
Network respondents: HH head				0.003	
				(0.008)	
Network respondents					0.059***
					(0.008)
Outcome mean	1.461	1.461	1.461	1.461	1.461
Outcome SD	0.453	0.453	0.453	0.453	0.452
Observations	9264	9264	9263	9264	9320
Village FEs	✓	✓	✓	✓	✓

Notes: All specifications estimated using OLS. Standard errors are clustered on village level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A3: Household degree with network module respondent characteristics as controls

	Outcome:					
	HHs visited or hosted		Visit/host in-degree		Visit/host out-degree	
	(1)	(2)	(3)	(4)	(5)	(6)
Migration past 12 months	0.032***	0.031**	0.053***	0.051***	0.005	0.004
	(0.012)	(0.012)	(0.017)	(0.017)	(0.012)	(0.012)
Permanent migration past 10 years	0.051***	0.047***	0.105***	0.099***	-0.020	-0.021
	(0.011)	(0.011)	(0.018)	(0.017)	(0.015)	(0.015)
Network respondents	0.054***	0.055***	0.043***	0.042***	0.054***	0.055***
	(0.006)	(0.006)	(0.009)	(0.009)	(0.008)	(0.008)
Male adults in HH	0.044***	0.043***	0.081***	0.080***	0.001	-0.000
	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)
Female adults in HH	0.029***	0.027***	0.047***	0.045***	0.003	0.002
	(0.003)	(0.003)	(0.004)	(0.004)	(0.002)	(0.002)
Median age	0.002***	0.002***	0.002**	0.002**	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Network respondents: Share 65 or older	0.004	0.003	0.008	0.002	-0.000	0.003
	(0.012)	(0.013)	(0.020)	(0.021)	(0.014)	(0.014)
Network respondents: Share migrants	-0.021*	-0.023*	-0.027	-0.026	-0.007	-0.011
	(0.012)	(0.012)	(0.017)	(0.017)	(0.013)	(0.013)
Network respondents: HH head	-0.058***	-0.060***	-0.083***	-0.085***	-0.031***	-0.032***
	(0.009)	(0.009)	(0.014)	(0.014)	(0.010)	(0.010)
Network respondents: Women only	-0.127***	-0.123***	-0.165***	-0.163***	-0.068***	-0.062***
	(0.012)	(0.012)	(0.018)	(0.018)	(0.013)	(0.013)
HH head education		0.020*		0.019		0.030***
		(0.011)		(0.016)		(0.011)
2nd Asset quartile (PCA)		0.015		-0.010		0.033**
		(0.013)		(0.020)		(0.013)
3rd Asset quartile (PCA)		0.049***		0.039**		0.047***
		(0.014)		(0.018)		(0.013)
4th Asset quartile (PCA)		0.067***		0.063***		0.056***
		(0.016)		(0.020)		(0.017)
Outcome mean	2.028	2.030	1.332	1.333	1.461	1.464
Outcome SD	0.465	0.464	0.671	0.670	0.453	0.453
Observations	9212	8995	9212	8995	9212	8995
Village FEs	✓	✓	✓	✓	✓	✓
Respondent characteristics	✓	✓	✓	✓	✓	✓

Notes: All specifications estimated using OLS. Standard errors are clustered on village level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

A.1.1 Variation in migration types

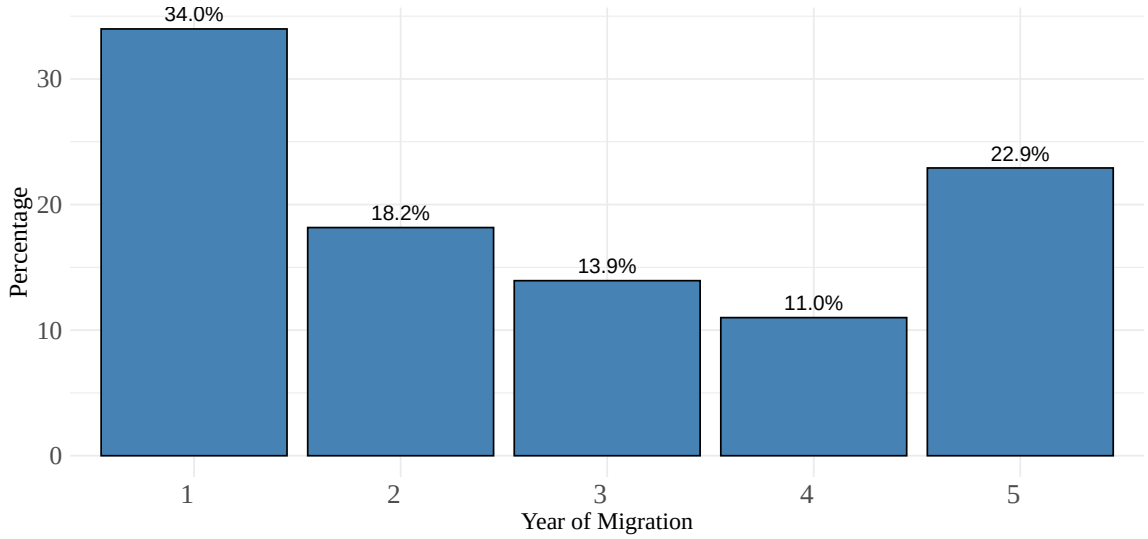

Figure A3: Distribution of migration years for target individuals

Notes: This figure presents the distribution of years migrated among target individuals with any internal or external migration experience between 2018-2022 (N=2,718).

A.1.2 Variation in link types

Table A4: Household degree (excluding family ties)

	HHs visited or hosted		Visit/host in-degree		Visit/host out-degree	
	(1)	(2)	(3)	(4)	(5)	(6)
Migration past 12 months	0.019	0.017	0.031**	0.029*	0.005	0.004
	(0.019)	(0.020)	(0.016)	(0.016)	(0.022)	(0.022)
Permanent migration past 10 years	0.043**	0.039**	0.089***	0.084***	-0.017	-0.019
	(0.019)	(0.019)	(0.019)	(0.019)	(0.024)	(0.025)
Network respondents	0.037***	0.036***	0.033***	0.032***	0.017	0.018
	(0.011)	(0.011)	(0.008)	(0.008)	(0.016)	(0.016)
Male adults in HH	0.052***	0.051***	0.073***	0.073***	0.009**	0.008**
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Female adults in HH	0.026***	0.025***	0.037***	0.036***	0.003	0.003
	(0.004)	(0.004)	(0.005)	(0.005)	(0.004)	(0.004)
Median age	0.001	0.001	0.001	0.001	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
HH head education		0.040**		0.028*		0.041**
		(0.015)		(0.014)		(0.018)
2nd Asset quartile (PCA)		0.006		-0.036*		0.027
		(0.023)		(0.020)		(0.023)
3rd Asset quartile (PCA)		0.054***		0.023		0.045**
		(0.019)		(0.018)		(0.022)
4th Asset quartile (PCA)		0.062***		0.047**		0.041*
		(0.023)		(0.021)		(0.024)
Outcome mean	1.436	1.438	0.954	0.955	0.955	0.957
Outcome SD	0.695	0.695	0.673	0.672	0.709	0.710
Observations	9269	9052	9269	9052	9269	9052
Village FEs	✓	✓	✓	✓	✓	✓

Notes: All specifications estimated using OLS. Standard errors are clustered on village level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Homophily

$$d_{ij} = \beta_0 + \beta_1 X_{ij} + \alpha_i + \gamma_j + \varepsilon_{ij} \tag{A1}$$

$$\text{where } X_{ij} = \begin{cases} \mathbf{1}(\text{same characteristic}_{ij}) & \text{for binary variables} \\ -|\text{wealth\_pca}_i - \text{wealth\_pca}_j| & \text{for wealth similarity} \end{cases} \tag{A2}$$

Following Bhargava et al. (2022), we estimate homophily effects using a linear probability model with dyadic data, where d_{ij} is a binary indicator for the presence of a social connection between households i and j. For binary characteristics such as migration status, X_{ij} equals 1 if households share the same characteristic and 0 otherwise. For continuous variables like wealth, we use the negative absolute difference between households ($-|\text{wealth\_pca}_i - \text{wealth\_pca}_j|$), where wealth is normalized between 0 and 1. This specification allows positive coefficients to indicate homophily in both cases. Specifically, $\beta_1 > 0$ means that households with the same characteristic (binary variables) or more similar wealth levels (continuous variables) are more likely to be connected. The model includes sender (α_i) and receiver (γ_j) household fixed effects to control for household-specific propensities to form connections. Standard errors are clustered at the enumeration area level to account for potential correlation within geographic clusters.

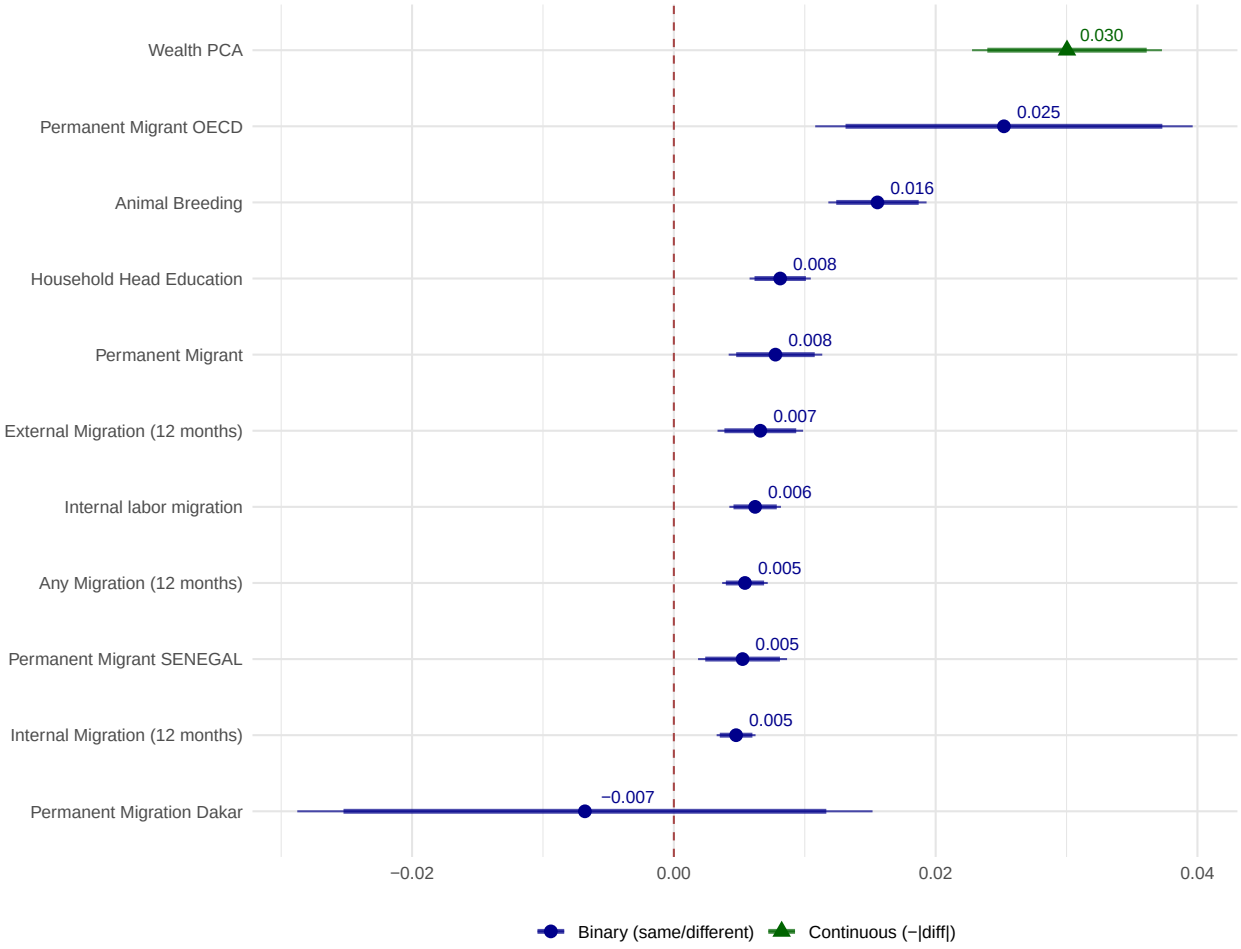

Figure A4: Homophily based on demographic characteristics

Note: Coefficients from linear probability models with sender and receiver fixed effects. Points represent coefficient estimates, with thinner lines showing 95% confidence intervals and thicker lines showing 90% confidence intervals. Positive coefficients indicate homophily (i.e., individuals are more likely to form social connections with others sharing that demographic characteristic). "Animal breeding" is an indicator for whether the household engages in pastoralism. All models include standard errors clustered at the village level.

Table A5: HH Degree: If I wanted to organize an event in the village and had to inform people in the village, who should I talk to?

	Outcome: Organizing an event								
	Log total degree			Log In-degree			Log Out-degree		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Migration past 12 months	0.015	0.017	0.019	0.013	0.016	0.013	0.014*	0.014*	0.017*
	(0.012)	(0.012)	(0.013)	(0.016)	(0.016)	(0.016)	(0.008)	(0.008)	(0.009)
Permanent migration past 10 years	0.074***	0.068***	0.057***	0.079***	0.072***	0.064***	0.025**	0.027***	0.020*
	(0.015)	(0.015)	(0.016)	(0.020)	(0.020)	(0.020)	(0.010)	(0.010)	(0.011)
Network respondents	0.055***	0.052***	0.053***	0.023***	0.020**	0.020**	0.051***	0.051***	0.052***
	(0.007)	(0.007)	(0.007)	(0.009)	(0.009)	(0.009)	(0.005)	(0.005)	(0.005)
Male adults in HH	0.037***	0.035***	0.028***	0.064***	0.061***	0.053***	-0.004**	-0.005**	-0.006***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)
Female adults in HH	0.019***	0.017***	0.019***	0.031***	0.028***	0.031***	-0.002	-0.002	-0.002
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)
Median age	0.002***	0.003***	0.002**	0.004***	0.004***	0.003***	-0.000	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
HH head education		0.009	0.010		-0.001	-0.001		0.021**	0.023**
		(0.013)	(0.014)		(0.017)	(0.018)		(0.009)	(0.010)
2nd Asset quartile (PCA)		0.013	0.016		0.012	0.012		-0.007	-0.005
		(0.016)	(0.017)		(0.020)	(0.021)		(0.011)	(0.012)
3rd Asset quartile (PCA)		0.038**	0.026*		0.044**	0.033*		0.000	-0.004
		(0.015)	(0.015)		(0.019)	(0.019)		(0.010)	(0.011)
4th Asset quartile (PCA)		0.063***	0.058***		0.090***	0.081***		0.007	0.010
		(0.016)	(0.017)		(0.020)	(0.021)		(0.011)	(0.012)
HH of village chief			1.210***			1.587***			-0.029
			(0.078)			(0.097)			(0.041)
Outcome mean	1.148	1.149	1.151	0.558	0.558	0.560	0.840	0.841	0.842
Outcome SD	0.574	0.572	0.573	0.701	0.698	0.699	0.389	0.389	0.392
Observations	9269	9052	7915	9269	9052	7915	9269	9052	7915
Village FEs	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: All specifications estimated using OLS. Standard errors are clustered on village level. Changes in the number of observations relative to results in the main specification reflects missingness in the chief household indicator for 16 villages. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

A.1.3 Plausible channels

Table A6: HH Degree: Who would you ask for migration advice or information?

	Outcome: Who would you ask for migration advice or information?					
	Log total degree		Log in-degree		Log out-degree	
	(1)	(2)	(3)	(4)	(5)	(6)
Migration past 12 months	0.005	0.005	0.004	0.005	-0.005	-0.006
	(0.014)	(0.014)	(0.013)	(0.012)	(0.012)	(0.012)
Permanent migration past 10 years	0.054***	0.048***	0.057***	0.049***	0.009	0.010
	(0.018)	(0.018)	(0.017)	(0.017)	(0.016)	(0.016)
Network respondents	0.043***	0.043***	0.027***	0.026***	0.036***	0.036***
	(0.008)	(0.008)	(0.007)	(0.007)	(0.008)	(0.008)
Male adults in HH	0.042***	0.041***	0.065***	0.063***	-0.004*	-0.004
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Female adults in HH	0.016***	0.014***	0.025***	0.022***	-0.004	-0.004
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)
Median age	0.001	0.001*	0.002***	0.002***	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
HH head education		0.023*		0.024		0.013
		(0.014)		(0.015)		(0.011)
2nd Asset quartile (PCA)		0.016		0.014		0.017
		(0.016)		(0.016)		(0.015)
3rd Asset quartile (PCA)		0.065***		0.075***		0.017
		(0.017)		(0.015)		(0.015)
4th Asset quartile (PCA)		0.062***		0.104***		-0.013
		(0.019)		(0.017)		(0.018)
Outcome mean	0.946	0.948	0.534	0.536	0.620	0.622
Outcome SD	0.579	0.578	0.579	0.578	0.474	0.474
Observations	9269	9052	9269	9052	9269	9052
Village FEs	✓	✓	✓	✓	✓	✓

Notes: All specifications estimated using OLS. Standard errors are clustered on village-level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A7: Within-village transfers

	Gave transfers (1)	Log transfers sent (2)	Received transfers (3)	Log transfers received (4)
Migration past 12 months	0.028*	0.014	0.031	0.029
	(0.017)	(0.057)	(0.020)	(0.076)
Permanent migration past 10 years	-0.019	-0.113**	0.003	-0.057
	(0.019)	(0.047)	(0.023)	(0.083)
Network respondents	-0.006	-0.021	0.010	-0.012
	(0.007)	(0.025)	(0.007)	(0.034)
Male adults in HH	0.003	0.011	0.002	0.031*
	(0.003)	(0.013)	(0.004)	(0.017)
Female adults in HH	0.004	0.036***	-0.006	-0.020
	(0.003)	(0.011)	(0.004)	(0.015)
Median age	0.000	0.001	0.001	0.002
	(0.001)	(0.003)	(0.001)	(0.005)
HH head education	0.014	0.099*	-0.008	0.009
	(0.015)	(0.055)	(0.018)	(0.069)
2nd Asset quartile (PCA)	0.022	0.119	0.010	-0.008
	(0.021)	(0.081)	(0.024)	(0.082)
3rd Asset quartile (PCA)	0.051***	0.029	0.010	0.062
	(0.016)	(0.061)	(0.023)	(0.086)
4th Asset quartile (PCA)	0.077***	0.236***	0.012	0.144*
	(0.019)	(0.062)	(0.022)	(0.080)
Outcome mean	0.752	9.941	0.602	9.565
Outcome SD	0.432	1.140	0.489	1.183
Observations	3922	2228	3765	1557
Village FEs	✓	✓	✓	✓

Notes: All specifications estimated using OLS. Standard errors are clustered on village level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A8: Household degree with alternative wealth measure

	Outcome:					
	Log total HHs		Log HHs visited		Log HHs hosted	
	(1)	(2)	(3)	(4)	(5)	(6)
Migration past 12 months	0.023**	0.021*	0.042**	0.040**	0.002	-0.001
	(0.011)	(0.011)	(0.016)	(0.016)	(0.012)	(0.012)
Permanent migration past 10 years	0.052***	0.049***	0.106***	0.102***	-0.020	-0.020
	(0.012)	(0.011)	(0.018)	(0.018)	(0.015)	(0.015)
Network respondents	0.060***	0.060***	0.050***	0.048***	0.057***	0.058***
	(0.005)	(0.006)	(0.008)	(0.008)	(0.008)	(0.008)
Male adults in HH	0.053***	0.052***	0.091***	0.092***	0.005**	0.004
	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)
Female adults in HH	0.028***	0.027***	0.046***	0.045***	0.002	0.001
	(0.003)	(0.003)	(0.004)	(0.004)	(0.002)	(0.002)
Median age	0.002***	0.002***	0.002**	0.002**	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
HH head education		0.024**		0.026		0.030***
		(0.011)		(0.016)		(0.011)
2nd Scorecard quartile (PCA)		0.021		0.006		0.024
		(0.013)		(0.019)		(0.016)
3rd Scorecard quartile (PCA)		0.019		0.028		0.004
		(0.014)		(0.019)		(0.018)
4th Scorecard quartile (PCA)		0.053***		0.025		0.060***
		(0.015)		(0.019)		(0.019)
Outcome mean	2.027	2.029	1.330	1.332	1.461	1.464
Outcome SD	0.465	0.464	0.671	0.670	0.453	0.452
Observations	9269	9047	9269	9047	9269	9047
Village FEs	✓	✓	✓	✓	✓	✓

Notes: All specifications estimated using OLS. The wealth scorecard index consists of a principal component index using the following standardized variables: does your residence have a seperate room for a kitchen?, does your household have the following things in good working order: a livingroom set, a bedroom set, a refrigerator/freezer, an electric iron, a table, a planter or sprayer? Standard errors are clustered on village level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A9: Household degree with network functions as predictors

	HHs visited or hosted		Visit/host in-degree		Visit/host out-degree	
	(1)	(2)	(3)	(4)	(5)	(6)
Migration past 12 months	0.021**	0.020**	0.038**	0.038**	0.002	0.000
	(0.010)	(0.010)	(0.015)	(0.015)	(0.012)	(0.012)
Permanent migration past 10 years	0.028***	0.026***	0.072***	0.069***	-0.028*	-0.028*
	(0.010)	(0.010)	(0.016)	(0.016)	(0.014)	(0.015)
Who ask for migration advice/information? (log degree)	0.104***	0.104***	0.162***	0.164***	0.021*	0.021*
	(0.010)	(0.010)	(0.015)	(0.014)	(0.012)	(0.012)
Who ask for advice on personal decision? (log degree)	0.339***	0.335***	0.475***	0.474***	0.132***	0.127***
	(0.011)	(0.012)	(0.019)	(0.019)	(0.016)	(0.016)
Network respondents	0.033***	0.033***	0.012	0.010	0.047***	0.048***
	(0.005)	(0.005)	(0.008)	(0.008)	(0.007)	(0.007)
Male adults in HH	0.033***	0.032***	0.063***	0.063***	-0.002	-0.003
	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)
Female adults in HH	0.019***	0.018***	0.033***	0.032***	-0.001	-0.002
	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)
Median age	0.001	0.001*	0.001	0.001	-0.000	0.000
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
HH head education		0.014		0.010		0.027**
		(0.010)		(0.013)		(0.011)
2nd Asset quartile (PCA)		0.020*		-0.003		0.037***
		(0.011)		(0.018)		(0.013)
3rd Asset quartile (PCA)		0.031***		0.013		0.043***
		(0.011)		(0.015)		(0.013)
4th Asset quartile (PCA)		0.048***		0.033*		0.052***
		(0.014)		(0.017)		(0.017)
Outcome mean	2.027	2.029	1.330	1.331	1.461	1.463
Outcome SD	0.465	0.464	0.671	0.670	0.453	0.453
Observations	9269	9052	9269	9052	9269	9052
Village FEs	✓	✓	✓	✓	✓	✓

Notes: All specifications estimated using OLS. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A10: Household degree

	Outcome: HHs visited or hosted			Visit/host in-degree			Visit/host out-degree		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Migration past 12 months	0.025**	0.023**	0.027**	0.042***	0.041***	0.046***	0.005	0.004	0.007
	(0.011)	(0.011)	(0.012)	(0.016)	(0.015)	(0.015)	(0.011)	(0.012)	(0.012)
Permanent migration past 10 years	0.051***	0.047***	0.046***	0.115***	0.110***	0.111***	-0.008	-0.008	-0.009
	(0.011)	(0.011)	(0.012)	(0.017)	(0.017)	(0.018)	(0.013)	(0.013)	(0.014)
Network respondents	0.059***	0.058***	0.057***				0.062***	0.062***	0.063***
	(0.005)	(0.006)	(0.006)				(0.007)	(0.007)	(0.008)
Male adults in HH	0.052***	0.050***	0.047***	0.090***	0.090***	0.084***	0.012***	0.011***	0.010***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)	(0.002)	(0.002)	(0.003)
Female adults in HH	0.028***	0.026***	0.025***	0.049***	0.047***	0.047***	0.004**	0.003	0.002
	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)
Median age	0.002***	0.002***	0.001**	0.002**	0.002**	0.001	0.000	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
HH head education		0.023**	0.027***		0.023	0.031*		0.030***	0.034***
		(0.010)	(0.010)		(0.015)	(0.016)		(0.011)	(0.010)
2nd Asset quartile (PCA)		0.024*	0.026*		0.006	0.007		0.038***	0.042***
		(0.012)	(0.013)		(0.020)	(0.021)		(0.012)	(0.013)
3rd Asset quartile (PCA)		0.054***	0.049***		0.045***	0.037*		0.040***	0.039***
		(0.013)	(0.014)		(0.017)	(0.019)		(0.012)	(0.013)
4th Asset quartile (PCA)		0.077***	0.078***		0.074***	0.068***		0.058***	0.066***
		(0.016)	(0.016)		(0.020)	(0.022)		(0.017)	(0.017)
HH of village chief			0.372***			0.495***			0.158***
			(0.036)			(0.052)			(0.039)
Outcome mean	7.400	7.415	7.405	4.133	4.138	4.129	4.219	4.231	4.223
Outcome SD	3.681	3.679	3.681	3.199	3.196	3.198	2.138	2.140	2.148
Observations	9249	9032	7897	9269	9052	7912	9249	9032	7897
Village FEs	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: All specifications estimated using OLS. Standard errors are clustered on village level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A11: Connected to village chief

	Outcome: Connected to village chief			
	In-degree		Out-degree	
	(1)	(2)	(3)	(4)
Migration past 12 months	0.011**	0.001	0.010	0.008
	(0.005)	(0.006)	(0.007)	(0.008)
Permanent migration past 10 years	0.010	0.011*	0.020**	0.018**
	(0.006)	(0.006)	(0.009)	(0.009)
Network respondents		-0.002		-0.002
		(0.004)		(0.004)
Male adults in HH		0.006***		0.001
		(0.002)		(0.001)
Female adults in HH		0.002		0.002
		(0.001)		(0.002)
Median age		0.000		0.000
		(0.000)		(0.000)
2nd Asset quartile (PCA)		-0.008		-0.012
		(0.006)		(0.009)
3rd Asset quartile (PCA)		0.002		0.007
		(0.006)		(0.009)
4th Asset quartile (PCA)		0.002		-0.005
		(0.007)		(0.010)
HH head education		0.001		0.003
		(0.006)		(0.006)
Outcome mean	0.039	0.039	0.066	0.066
Outcome SD	0.194	0.193	0.249	0.248
Observations	8126	7867	8126	7867
Village FEs	✓	✓	✓	✓
Respondent characteristics		✓		✓

Notes: All specifications estimated using OLS. Standard errors are clustered on village level. In addition to the covariates listed, the specifications also include indicators for whether any of the network module respondents included the household head, women only, and shares of the individuals who migrated in the past 12 months over the total number of network module respondents and the share of individuals 65 or above. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A12: Heterogeneity in household degree by village-level migration rates

	Outcome: Log total HHs			
	Low migration	High temporary, Low permanent	High permanent, Low temporary	High migration
	(1)	(2)	(3)	(4)
Migration past 12 months	0.031	0.006	0.021	0.015
	(0.018)	(0.033)	(0.021)	(0.020)
Permanent migration past 10 years	0.099***	-0.021	0.072**	0.030**
	(0.022)	(0.045)	(0.030)	(0.013)
Network respondents	0.067***	0.073***	0.055***	0.050***
	(0.012)	(0.014)	(0.013)	(0.008)
Male adults in HH	0.044***	0.048***	0.054***	0.059***
	(0.004)	(0.006)	(0.005)	(0.004)
Female adults in HH	0.033***	0.021***	0.024***	0.023***
	(0.006)	(0.007)	(0.006)	(0.003)
Median age	0.002	0.001	0.002	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)
HH head education	0.046**	0.025	-0.008	0.015
	(0.018)	(0.033)	(0.026)	(0.016)
2nd Asset quartile (PCA)	0.030	0.050	-0.050	0.033
	(0.021)	(0.034)	(0.041)	(0.020)
3rd Asset quartile (PCA)	0.068***	0.061	0.056	0.047**
	(0.020)	(0.038)	(0.040)	(0.022)
4th Asset quartile (PCA)	0.089***	0.040	0.105***	0.071***
	(0.028)	(0.051)	(0.034)	(0.025)
Outcome mean	2.019	1.989	1.952	2.093
Outcome SD	0.458	0.480	0.468	0.453
Observations	3022	1479	1446	3105
Village FEs	✓	✓	✓	✓

Notes: Column 1 presents results for the sample of villages where permanent and temporary migration rates are below the full village sample median. Column 2 presents results for villages with above-median temporary migration rates and below-median permanent migration rates. Column 3 presents results for villages with below-median temporary migration rates and above-median permanent migration rates. Column 4 includes villages with above-median temporary and permanent migration rates. All specifications estimated using OLS. Standard errors are clustered on village level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A13: Summary statistics by village-level migration rates

Variable	Obs.	Mean	Std. Dev.	Min	Max
Low migration villages					
Migration past 12 months	3,138	0.55	0.50	0.00	1.00
Permanent migration past 10 years	3,121	0.08	0.27	0.00	1.00
Low temporary, high permanent migration villages					
Migration past 12 months	1,480	0.56	0.50	0.00	1.00
Permanent migration past 10 years	1,472	0.21	0.41	0.00	1.00
High temporary, low permanent migration villages					
Migration past 12 months	1,517	0.77	0.42	0.00	1.00
Permanent migration past 10 years	1,509	0.08	0.27	0.00	1.00
High migration villages					
Migration past 12 months	3,187	0.80	0.40	0.00	1.00
Permanent migration past 10 years	3,171	0.26	0.44	0.00	1.00

Table A14: Summary Means from Intercepts

	All	Permanent	Temporary	Both
Total degree	7.398	7.929	7.746	8.135
In-degree	4.133	4.793	4.452	4.986
Out-degree	4.219	4.246	4.309	4.293
Total degree	2.878	3.148	2.974	3.191
In-degree	1.524	1.798	1.628	1.848
Out-degree	1.553	1.57	1.549	1.563
Total degree	2.041	2.273	2.114	2.343
In-degree	1.061	1.259	1.137	1.329
Out-degree	1.08	1.128	1.073	1.12
Total degree	2.88	3.239	2.953	3.231
In-degree	1.484	1.816	1.564	1.82
Out-degree	1.507	1.553	1.503	1.54
Received (yes/no)	.603	.644	.614	.653
Received amount	27310.79	28435.71	27811.22	29102.61
Sent (yes/no)	.753	.756	.761	.762
Sent amount	37574.29	38400.4	37951.49	39235.23
Migration past 12 months	.672	.782	1	1
Internal migration past 12 months	.636	.752	.946	.961
External migration past 12 months	.141	.159	.209	.203
Permanent migration past 10 years	.161	1	.188	1
Permanent internal migration past 10 years	.13	.804	.155	.824
Permanent OECD migration past 10 years	.023	.14	.023	.12
Permanent non-OECD migration past 10 years	.02	.122	.024	.128
Median age	33.513	33.803	32.577	32.988
HH head education	.252	.243	.259	.243
Asset index (PCA)	.001	.174	.048	.168
Male adults in HH	3.412	3.69	3.828	3.942
Female adults in HH	3.567	3.999	3.89	4.197
Network respondents	1.61	1.683	1.653	1.721
Network respondents: Women only	.283	.238	.275	.227
Network respondents: Share 65 or older	.118	.121	.125	.121
Network respondents: Share migrants	.237	.297	.352	.379
Network respondents: HH head	.559	.563	.539	.544

Table A15: Household degree

	Outcome:					
	HHs visited or hosted		Visit/host in-degree		Visit/host out-degree	
	(1)	(2)	(3)	(4)	(5)	(6)
Migration past 12 months	0.031***	0.030***	0.053***	0.052***	0.008	0.008
	(0.011)	(0.011)	(0.016)	(0.016)	(0.011)	(0.011)
Permanent migration past 10 years	0.050***	0.047***	0.111***	0.106***	-0.008	-0.008
	(0.011)	(0.011)	(0.017)	(0.017)	(0.013)	(0.013)
Network respondents	0.058***	0.057***	0.050***	0.049***	0.061***	0.062***
	(0.005)	(0.006)	(0.008)	(0.008)	(0.007)	(0.007)
Male adults in HH	0.054***	0.052***	0.091***	0.091***	0.013***	0.012***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)
Female adults in HH	0.028***	0.026***	0.049***	0.046***	0.005**	0.004
	(0.002)	(0.003)	(0.004)	(0.004)	(0.002)	(0.002)
Median age	0.002***	0.002***	0.002**	0.002***	0.000	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Number of past adults in household (12m)	-0.016***	-0.015***	-0.025***	-0.024***	-0.008**	-0.009**
	(0.004)	(0.004)	(0.006)	(0.006)	(0.004)	(0.004)
HH head education		0.023**		0.026*		0.030***
		(0.010)		(0.015)		(0.011)
2nd Asset quartile (PCA)		0.023*		0.000		0.038***
		(0.012)		(0.020)		(0.012)
3rd Asset quartile (PCA)		0.054***		0.042**		0.040***
		(0.013)		(0.017)		(0.012)
4th Asset quartile (PCA)		0.076***		0.072***		0.058***
		(0.016)		(0.020)		(0.017)
Outcome mean	7.400	7.415	4.134	4.139	4.219	4.231
Outcome SD	3.681	3.679	3.199	3.196	2.138	2.140
Observations	9249	9032	9249	9032	9249	9032
Village FEs	✓	✓	✓	✓	✓	✓

Notes: All specifications estimated using OLS. Standard errors are clustered on village level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.