Migration and co-residence choices[*]

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Abstract

Co-residence choices represent an under-studied topic in economics, where household composition is often regarded as exogenous. The migration literature makes no exception in this respect, relying on the assumption that the migration of a household member is not systematically associated with further variations in co-residence choices. We rely on a large Mexican rotating panel survey to provide empirical evidence on the correlation between the occurrence of an international migration episode and additional changes in household composition. Migrant households have a 39 percent higher probability of receiving a new member over a one-year period around the migration of one of its members. Attrition is significantly higher among migrant households, and we provide suggestive evidence that this is due to the dissolution of the household of origin of the migrant, with the members left behind joining another household. The observed endogeneity of co-residence choices has implications for survey-based measurement of migration flows, for the analysis of the determinants of intra-household selection into migration, and for the effects of migration on those left behind.

"Household structure is pervasively treated as an exogenous or fixed characteristics."

(Foster and Rosenzweig, 2002, p. 839)

1 Introduction

Surveys or population censuses conducted at the household-level in migrant-sending countries represent a key data source for the analysis of the scale of international migration flows, of their determinants, and of the ensuing effects on the individuals left behind. The design of the questionnaires used for data collection and most empirical analyses (often implicitly) rely on the assumption that the occurrence of migration episodes is *not* systematically associated with further variations in the composition of the household.[1] Such an assumption is in line with a long-standing practice in the economic literature, as suggested by the initial quote from Foster and Rosenzweig (2002), but it has a dubious plausibility, especially for migrant-sending countries characterized by a variety of living arrangements, where nuclear households represent the exception rather than the rule. A violation of this assumption would entail that some migration episodes simply go unrecorded, and it would also have relevant analytical implications.[2]

Consider, for instance, the phrasing of the question included in the 2000 Mexican population census, which is representative of the retrospective questions that are used to elicit information on past migration episodes:

> "During the last five years, that is, from January 1995 to today, has any person that lives or lived with you (in this household) gone to live in another country?"

The migration episodes that emerge out of the answers to this question are relied upon to obtain an origin-based measurement of migration flows.[3] Furthermore, the members of the household reporting a migration episode are assumed to constitute the group of individuals the migrant was co-residing with at the time of migration. This reconstruction of the

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[1]Gibson *et al.* (2011) represent an exception in this respect, as the empirical plausibility of this assumption is assessed (see p. 1302).

[2]Barsbai and Thiele (2013), Rosenzweig and Zhang (2014) and Hamoudi and Thomas (2014) provide examples of the implications for the economic analysis of endogenous variations in co-residence choices.

[3]By construction, instances in which a household entirely migrates cannot be detected with this type of question (Ibarraran and Lubotsky, 2007).

composition of the household of origin of the migrant is then used to analyze the determinants of intra-household selection into migration (Chort and Senne, 2015, 2017; Dustmann *et al.*, 2017), or to estimate the multifaceted effects of migration on those left behind (see, for instance, Yang, 2008, McKenzie and Rapoport, 2011, Batista *et al.*, 2012 or Bertoli and Marchetta, 2014).

A systematic association between migration and a variation in co-residence choices would drive a wedge between the composition of the household of origin of the migrant, and the household that reports the migration episode. New members might have joined the household since the migrant left the country, and some individuals that were co-residing with the migrant might have left. The phrasing of the retrospective question is such that the households that these individuals joined (or formed) should *not* report any migration episode, as the question specifies that only the household that the migrant was living in should report it.[4] This also entails that a migration episode would remain unrecorded if the household of origin of the migrant has dissolved,[5] with all its members left behind joining another household.[6] The non-reporting of migration episodes, while perfectly consistent with the design of the questionnaire, would pose an important threat to the analysis of the effects of migration on those left behind, as treated individuals would be incorrectly regarded as untreated, thus contaminating the control group.

Why should one expect migration to be systematically associated with further changes in co-residence choices of the individuals left behind? International migration episodes often reflect the outcome of a decision taken jointly by the migrant and by a group of non-migrants, as Stark and Bloom (1985) observe, which is not necessarily restricted to the household.

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[4]The compliance of the respondents with this requirement is also ensured by a follow-up question: "When [name] migrated (for the last time), was [name] living with you?", with no information being collected in case of a negative answer; the INEGI clarifies that this restriction is introduced to attain two distinct objectives: a correct assignment of migrant to his or her area of origin, and no double-counting of migration episodes that would arise if more than one household was allowed to report the same migration episode (see INEGI, *XII Censo General de Población y Vivienda 2000. Coordinación de Evaluación y Desarollo Metodológico*, p. 50).

[5]This would be, for instance, the case of a nuclear household, where the husband migrates, while the wife and the children join the household of the maternal grandparents, that also reside in the country of origin.

[6]Wong *et al.* (2006), cited by Teruel *et al.* (2012), warned that household dissolution can lead to an undercount of migration episodes, even if the members left behind remain in the country of origin; notice that whole household migration can represent a specific instance of the dissolution of the household of origin of the migrant, when all members move abroad simultaneously.

International migration is depicted, since the seminal contribution by Sjaastad (1962), as an investment decision which can be subject to binding liquidity constraints. Resource pooling across non co-resident family members can help overcoming liquidity constraints, allowing to undertake the (lumpy) investment in the migration of a family member.[7] The reshuffling of the partition of family members into separate households could thus be a by-product of the decision to migrate, with the choice to co-reside being driven by the objective of getting direct access to the remittances sent back by the migrants, or by the need to replace the migrant in the provision of labor-intensive services, such as child or elderly care.[8] If we consider a non-unitary model of decision making between non co-resident family members (see, for instance, LaFave and Thomas, 2017), then the choice to co-reside could represent a way to reduce co-ordination costs and informational asymmetries.[9]

This paper addresses three interrelated research questions: (*i*) do households that experience an international migration episode also undergo further changes in their composition? (*ii*) Are these changes selective? (*iii*) Do we observe a significant under-count of migration episodes because of variation in co-residence choices? We provide an answer to these research questions in the case of Mexico. This country represents a focal point in the migration literature, and there is empirical evidence about the sharing of resources across non co-resident family members (Angelucci *et al.*, 2010, 2017), and on the existence of binding financial constraints on migration (Angelucci, 2015), two factors that could magnify the association between migration and variations in co-residence choices.[10]

Addressing the proposed research question requires having access to panel data that

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[7]Poirine (1997) portrays remittances as a part of "implicit family loan arrangement", with the migrant that can transfer resources back to kindred; non-migrant members could be contributing to migration not just through the provision of resources need to cover migration costs, but also through the provision of services to the individuals left behind by the migrant.

[8]Further reasons that could give rise to a correlation between migration episodes and variation in co-residence choices could be related to the associated savings in housing costs in urban areas or th the need to replace the migrant in family-run agricultural activities in rural areas.

[9]Similarly, having the spouse left behind co-residing, for instance, with the migrant's parents could a way to give the migrant greater information (and hence control) over the use of the remittances sent back home; see Ashraf *et al.* (2015) on the role of informational asymmetries in transnational households.

[10]McKenzie (2003) provides empirical evidence that Mexican households did not react to the 1995 peso crisis with a variation in their living arrangements, although such a variation might have taken place in the subset of migrant households (see, for instance, Monras, 2015 on the increase in Mexican migration after the peso crisis).

allows observing the occurrence of international migration episodes, and the potential variations in household composition around the time of migration. We rely on the data from 12 quarters, from 2005Q1 to 2007Q4, of the *Encuesta Nacional de Ocupación y Empleo* (ENOE) run by the INEGI, the Mexican national statistical office.[11] The ENOE is a short rotating panel survey where each household is followed over five consecutive quarters. This survey allows us observing variations in the household roster over time, as well as identifying migrant households, that we define as those where (at least) one member moves to the United States over the period of observation. Migrant households represent around 2.2 percent of the more than 170,000 households in the sample that we use for the empirical analysis. Households are asked about the reason why individuals that had been included in the roster in the previous quarter are absent from the household, and international migration represents one of the possible answers.[12] Notice that the identification of international migration episodes from variations in the roster shares a key feature with the one based on questions on past migration episodes, as both approaches require that the migrant was a member of the (surveyed) household at the time of migration.[13]

Once we collapse the longitudinal dimension of the data and we control for a rich array of initial household characteristics, we find that the probability that a migrant household receives at least one new member over a 12-month period around the migration episode is 39 percent higher than for non-migrant households, while they are significantly *less* likely to report the departure of one of their members.[14] Migrant households have a probability of attrition that is 24 percent higher than non-migrant households. The dissolution of the households of origin of the migrants is a natural candidate for this differential probability of

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[11]The choice of the period of analysis is motivated by the need to focus on a country with a relatively high rate of international migration, and Mexico before the recent economic crisis satisfies this condition (see Chort and de la Rupelle, 2016 for data on the recent evolution of Mexican migration flows to the United States).

[12]This entails that migration episodes (as well as further variations in the household composition) can be identified from the second to the fifth interview of each household, i.e., over a 12-month period.

[13]This is actually a necessary but not a sufficient condition for the ENOE, which relies on a slightly stricter requirement: the migrating individual must have been included in the household roster in at least one round of the survey, i.e., the migration of an individual who is (temporarily) a member of the household just before leaving Mexico remains unreported if no survey takes place while she is present in the household.

[14]These estimates are obtained on a balanced panel of households that are interviewed for five consecutive quarters in the ENOE.

attrition.[15] Specifically, the data reveal that the probability that a non-migrant household reports receiving remittances from abroad at the end of the observation period (conditional upon not receiving them at the beginning) is positively associated with the arrival of a new member, and that such an effect is increasing with the migration rate at the municipal level. This provides suggestive evidence that the attrition of migrant households could be due to dissolution, with their members joining non-migrant (according to the definition employed in the ENOE) households, that thus start receiving remittances from abroad. Furthermore, the members that join migrant households significantly differ from the individuals that are constantly in the household roster over the period of observation with respect to their age profile, and their relationship to the household head. The observed variations in co-residence choices reduce the share of migrant households that have a nuclear structure, as the new members have weaker familial ties with the household head.

Our paper makes three distinct contributions to the migration literature. First, it provides empirical evidence about the joint determination of migration decisions and co-residence choices. This variation in household composition poses challenges for the analysis of the effects of on those left behind similar to those observed in different domains of economic analysis employing household-level data (Barsbai and Thiele, 2013; Hamoudi and Thomas, 2014). Second, our paper complements our understanding of the implications of whole household migration (Steinmayr, 2015) and intra-household selection into migration (Murard, 2015). The analysis, and our interpretation, of the effects produced by migration on those left behind, do not depend just on the decisions related to the migrant(s), but it also hinges on the co-residence decisions of non-migrant members. Third, it reveals that the discrepancy between the origin and the destination-based measurement of migration episodes based on survey or census data can be due to the variation in co-residence choices at origin that are associated with migration, which represents an additional and distinct factor with respect to whole household migration or a deliberate non-reporting of (undocumented) migration episodes (Ibarraran and Lubotsky, 2007).

The rest of the paper is structured as follows: Section 2 presents the data used in the analysis, and it introduces the relevant definitions; Section 3 develops the empirical analysis.

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[15]Whole household migration is an alternative (though not mutually exclusive) explanation, but the household disappears from the sample *after* the migration episode has been reported, so that all members cannot have moved out of Mexico simultaneously.

Finally, Section 4 draws the main conclusions.

2   Data and definitions

We describe here the main data source for our empirical analysis, we introduce the relevant definitions and we present basic descriptive statistics.

2.1   The ENOE survey

We draw the data for our analysis from the quarterly Mexican *Encuesta Nacional de Ocupación y Empleo* run by the INEGI. The ENOE is a labor market panel survey, which is based on a rotating sample: each household is included in the sample for five consecutive quarters, with around 21,000 households entering the sample in each round of the survey.Our sample includes all the households that entered the sample of the ENOE over a two-year period, namely between the first quarter of 2005 and the last quarter of 2006, for which we potentially have data for five quarters.[16] The ENOE tracks housing units over time: from the second to the fifth interview, a household is included in the sample if (i) it is still residing in the same housing unit, and (ii) there is at least one individual aged 12 or above that was listed in the household rosters of the previous interview.[17] The members of each household in the sample are assigned individual identifiers that do not vary across the five interviews, provided that they are continuously part of the household roster.

2.2   Definitions

Let R_{js} represent the set of individuals listed in the roster of household j in the interview s, with $s = 1, ..., 5$, and let $R_j \equiv \bigcup_s R_{js}$ represent the set of individuals listed in the roster in at least one of the five interviews. We say that household j is a migrant household if there is at least one period s, with $s = 2, ..., 5$, and an individual $i \in R_j$ such that: (i) $i \in R_{js-1}$, (ii) $i \notin R_{js}$, and (iii) individual i is reported by the remaining household members to have

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[16]This entails that we also draw on the data from the 2006Q1-2006Q4 rounds of the ENOE, but just with respect to the households that had entered in the fourth quarter of 2005; see also Table A.1 in the Appendix.

[17]For instance, a household composed by one parent and children below the age of 12 would be excluded from the sample if the parent moves abroad, and other adult family members come to reside in the same housing unit (see INEGI, *Manual del entravistador de la ENOE*, p. 71).

migrated abroad in the interview s.[18] According to (i), no migration episode can be reported by household j for individuals that have not been included in at least one quarter in the roster of household j itself. We then define a dummy variable M_j taking the value of 1 if household j reports at least one migration episode over the period of observation, and 0 otherwise.[19]

The individual $i \in R_j$ is a new member if there is an interview s, with $s = 2,...,5$, such that (i) $i \notin R_{js-1}$, and (ii) $i \in R_{js}$. We say that household j has received (at least) one new member over the period of observation if there is at least $i \in R_j$ satisfying these two conditions. Newborn babies, household servants, and individuals that were incorrectly omitted from the household roster in the previous quarter are not counted as new members of the household. Notice that the same individual $i \in R_j$ can be at the same time a new member and an international migrant: for instance, a household member that is reported to have moved to the United States between the first and the second interview might re-appear in the household roster in, say, the fourth interview. Clearly, we need to avoid that temporary migration episodes give rise to a mechanical correlation between these two variables, and we thus define a dummy N_j taking the value of 1 if household j received at least one new member, who is *not* an international migrant,[20] over the period of observation, and 0 otherwise.

Similarly, we say that individual $i \in R_j$ has left household j if there is an interview s, with $s = 2,...,5$, such that (i) $i \in R_{js-1}$, and (ii) $i \notin R_{js}$. Individuals that passed away, household servants and migrants to the United States are not counted as leaving members.[21] We thus define a dummy variable L_j taking the value of 1 if household j loses at least one

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[18]The ENOE does not report the country of destination, but we can safely assume that it is the United States (see, for instance, Mishra, 2007).

[19]Notice that non-migrant households might have experienced the migration of one of their members before the 12-month period over which these changes can be observed in the ENOE, which does not contain any retrospective question on migration.

[20]The ENOE assigns constant identifiers to all the individuals in R_j that are continuously present in the roster, while a returnee is *not* assigned the same individual code that she had before leaving the household; thus, we verify whether new members have the same date of birth and gender of individuals appearing in the household roster in a previous interview, and we consider that they are the same individual when this is the case.

[21]Without this latter restriction, we would have a mechanical and trivial correlation between migration episodes and instances in which an individual leaves the household, as by construction, any international migrant is also an individual that has left the household.

of its members that does not migrate abroad, and 0 otherwise. Notice that the dissolution of a household occurs whenever a household loses all of its members, so that dissolution is intimately related to attrition.[22] Finally, we define a dummy variable $V_j \equiv \max\{N_j, L_j\}$ that takes the value of 1 if household j has recorded a variation in its composition (either an expansion or a contraction) over the period of analysis, and 0 otherwise.

2.3 Descriptive statistics

The sample used in our analysis includes 170,306 households whose first interview in the ENOE took place between 2005Q1 and 2006Q4, out of which 147,288 that were successfully interviewed for five consecutive quarters. The rate of attrition for the households is around 3.4 percent from one quarter to the next, with 13.5 percent of the households not completing the five interviews, as reported in Table 1.[23] As the probability that a household reports a migration episode increases with the number of interviews, the share of migrant households that do not complete five interviews is mechanically lower than the corresponding share of non-migrant households (5.1 and 13.7 percent respectively).

5,369 international migration episodes are reported by 4,243 distinct households,[24] representing 2.49 percent of the sample. The share of migrant households is substantially higher in rural (4.40 percent) than in urban areas (1.75 percent), although in absolute terms both areas are equally important.[25] International migrants are predominantly male (76 percent), younger (30 and 38 years of age respectively) and less educated (8.7 and 9.6 years of completed schooling) than non-migrants. Among the 5,369 international migrants, 91.1 percent of them were included in the roster of the household reporting their migration in the first interview, while 8.9 percent of them joined the household shortly before leaving Mexico. Around 12 percent of international migrants leave their households only temporarily, as they are observed again in the roster before the last interview.[26]

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[22]Clearly, we are able to observe that a household loses one of its members only conditional upon not loosing all of them.

[23]The incidence of attrition is in line with the one reported by Alcaraz *et al.* (2012) for later rounds of the ENOE survey.

[24]82 percent of migrant households report just one migration episode over the period of analysis, 11 percent two episodes and 7 percent more than two.

[25]Rural areas are defined as localities with less than 15,000 inhabitants, but the majority of these localities have less than 2,500 inhabitants.

[26]As described in the previous section, the instances in which an international migrant appears as a new

Table 1: Descriptive statistics

Households	Entire sample			Rural areas			Urban areas		
	All	Non-migrant	Migrant	All	Non-migrant	Migrant	All	Non-migrant	Migrant
Attrition rate (five quarters)	0.135	0.137	0.051	0.095	0.098	0.035	0.151	0.152	0.067
Household size	4.021	3.992	5.066	4.222	4.171	5.251	3.938	3.920	4.881
Children aged 5 or below	0.434	0.430	0.578	0.529	0.522	0.656	0.395	0.393	0.500
Children 6-14	0.761	0.755	0.979	0.916	0.904	1.168	0.697	0.695	0.790
Individuals aged 65 or above	0.235	0.237	0.157	0.273	0.279	0.161	0.219	0.220	0.153
Dummy for children 0-5	0.321	0.318	0.409	0.372	0.368	0.456	0.300	0.299	0.361
Dummy for children 6-14	0.464	0.462	0.549	0.511	0.506	0.617	0.445	0.444	0.481
Dummy for elderly members	0.184	0.186	0.127	0.210	0.214	0.132	0.174	0.175	0.121
Highest years of education	10.794	10.804	10.414	8.540	8.510	9.143	11.721	11.722	11.689
Dummy for three-generation households	0.157	0.156	0.224	0.161	0.159	0.213	0.156	0.154	0.234
Receipt of remittances from abroad	0.051	0.049	0.149	0.092	0.087	0.186	0.035	0.033	0.113
Receipt of transfers from Mexico	0.125	0.126	0.086	0.129	0.132	0.075	0.123	0.124	0.096
Observations (total)	170,306	166,063	4,243	47,457	45,368	2,089	122,849	120,695	2,154
Observations (non-attrited)	147,288	143,263	4,025	42,937	40,921	2,016	104,351	102,342	2,009

Notes: All the household characteristics are measured at the time of the first interview.
Source: Authors' elaboration on ENOE, 2005Q1-2007Q4.

If we compare the characteristics of migrant and non-migrant households at the first interview, we can notice that living arrangements differ between the two groups of households even before the occurrence of a migration episode.[27] Migrant households have, on average, 5.02 members, compared to 3.91 members for non-migrant households, and a larger share of them has more than two generations that co-reside (21.9 and 14.4 percent respectively). Around 5.0 percent of households report to have been receiving remittances from abroad over a three-month recall period preceding the the first interview, with this share being substantially higher in rural (9.0 percent) than in urban areas (3.5 percent).[28]

As reported in Table 2, 22.7 percent of the households in the sample experience a variation in their composition over the 12-month period of observation ($V_j = 1$ using the notation that we introduced above), 11.1 percent saw at least one new member joining ($N_j = 1$), and 17.1 percent lost at least one of their member ($L_j = 1$).[29] Households that receive at least one

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member in the household roster are *not* included in the definition of either N_j or V_j.

[27]Recall that the migration episodes that are used to identify migrant households are recorded only since the second interview, so that the first interview intervenes before the treatment.

[28]The question on remittances is included only in a subset of the rounds of the ENOE, from 2005Q1 to 2006Q2.

[29]These figures refer to the sub-sample of 147,288 households that have been interviewed for five consecutive quarters.

Table 2: Migration and variations in co-residence choices

Households	Entire sample			Rural areas			Urban areas		
	All	Non-migrant	Migrant	All	Non-migrant	Migrant	All	Non-migrant	Migrant
New members joining ($N_j = 1$)	0.111	0.109	0.163	0.117	0.116	0.137	0.108	0.107	0.189
Number of new members (conditional on $N_j = 1$)	1.719	1.715	1.816	1.704	1.702	1.736	1.726	1.721	1.873
One new member, share (conditional on $N_j = 1$)	0.635	0.637	0.590	0.642	0.642	0.635	0.632	0.634	0.557
New members joining ($N_j = 1$), no returnees	0.103	0.102	0.130	0.103	0.103	0.100	0.103	0.102	0.159
Leaving members ($L_j = 1$)	0.171	0.170	0.210	0.177	0.176	0.201	0.169	0.168	0.220
Number of leaving members (conditional on $L_j = 1$)	1.848	1.848	1.842	1.863	1.866	1.812	1.841	1.841	1.868
One leaving member, share (conditional on $L_j = 1$)	0.594	0.596	0.560	0.585	0.585	0.585	0.599	0.600	0.537
New or leaving members ($V_j = 1$), no returnees	0.221	0.219	0.277	0.227	0.226	0.253	0.218	0.216	0.301
New or leaving members ($V_j = 1$)	0.227	0.225	0.302	0.239	0.237	0.280	0.222	0.220	0.324
Observations (non-attrited)	147,288	143,263	4,025	42,937	40,921	2,016	104,351	102,342	2,009

Notes: the sample includes households that have been interviewed for five consecutive quarters.

Source: Authors' elaboration on ENOE, 2005Q1-2007Q4.

new member receive, on average, 1.72 new members, with 63.5 percent of them receiving only one new member; households leaving members lose, on average, 1.85 individuals, and 59.4 percent of them lose just one of their members over the period of analysis.

Table 2 reveals that 30.2 percent of migrant households experience a variation in their composition, a share that is significantly larger than the 22.5 percent that is observed for non-migrant households. This comes both from a larger proportion of households receiving at least one new member (16.3 and 10.9 percent respectively), and from a larger share losing at least one member (21.0 and 17.0 percent respectively). Table 2 also reveals that the differences between migrant and non-migrant households are more pronounced in urban than in rural areas.

These variations in household composition are produced by 69,804 individuals who either join or leave a household (or both): 58 percent of them are observed leaving the household, 29 percent join the household, and 13 percent both join and leave in different quarters (irrespective of the relative timing of these two events).[30] If we compare the relative timing

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[30]Notice that we should not expect a balance between the number of individuals that join and that of the individuals that leave a household over the entire sample, unless the instances of household formation and household dissolution match. For instance, imagine that a couple gets married, with both spouses leaving the households of their parents forming a new household; both spouses would be recorded as leaving members, but they would *not* be recorded as new members, as they do not join an existing household, but rather they form their own household, i.e., they do not enter the roster of a pre-existing household, Clearly, household dissolution (which represents the opposite case to household formation) would produce an excess of new over leaving members, but it is likely to be less frequent than the formation of new nuclear households upon marriage.

of migration episodes and variations in household composition, we have that among migrant households receiving (at least) one new member, 43 percent of them receive the new member after the migration episode, 26 percent in the same quarter, and 30 percent in a preceding quarter.[31]

3   Empirical analysis

Table 2 reveals that the occurrence of migration episodes is systematically associated with further variations in co-residence choices. Although our objective here is not to establish a causal relationship between these two closely intertwined phenomena,[32] we can nevertheless verify whether this stylized fact is robust once we control for initial household characteristics that could be correlated with both, and with possible spatial differences in migration and in the frequency of variations in household composition. Specifically, Table 1 evidences that migrant households are initially larger in size (5.07 and 3.99 members respectively in the first interview), and that a higher share of them already departs from a nuclear household structure, with at least three generations co-residing (22.4 and 15.6 percent).[33,34]

3.1   Migration and variations in co-residence choices

We thus resort to the estimation of linear probability models on the sub-sample of 147,288 households that have been interviewed for five consecutive quarters, allowing for a very flexible pattern of correlation between initial household characteristics and variations in co-

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[31]The relative timing of migration episodes and of the instances in which a member leaves the household is broadly similar, with 36 percent leaving after the migration episode, and 32 percent both in a previous or in the same quarter.

[32]Migration is, in itself, a decision concerning co-residence.

[33]Some of the new members that join report to be coming back from the United States, as evidenced in Table 2; all the results reported in Section 3 are robust to the exclusion of US returnees from the definition of new members; results are available from the Authors upon request.

[34]Movements in and out the household roster can occur be just temporary in nature, and being reverted during the period of analysis; all the results that are reported below are robust once we disregard variations in household composition that are reverted before the last interview; results are available from the Authors upon request.

residence choices,[35] and also including dummies for each Mexican municipality in the ENOE sample.[36]

Table 3 reports, for the entire sample and separately for urban and rural areas, four specifications in which the dependent variable is the dummy N_j for receiving new members. Controlling for initial household characteristics and municipal fixed effects does not alter the picture on the entire sample: the difference in the probability of receiving a new member, which stands at 5.4 percentage points in the raw data, narrows down only to 4.3 percentage points. Thus, controlling in a flexible way for a rich array of household characteristics and relying only on within-municipality variability for identification reveals that migrant households are 39.4 percent more likely to experience one additional variation in their composition over the 12-month period of analysis. The difference is larger (and, again, largely insensitive to the inclusion of additional controls) in urban areas, where the difference in probability between the two groups of households stands at 7.4 percentage points, i.e., urban migrant households are 69.2 percent more likely than urban non-migrant households to receive at least one new member. Conversely, the differences in rural areas, that were smaller to begin with, are no longer statistically significant once we control simultaneously for initial household characteristics and municipal dummies.

Table 4 reports the same set of four specifications as in Table 3, with the dummy L_j for losing at least one member as the dependent variable. When we consider a simple bivariate correlation between L_j and M_j, we see that migrant households are also more likely to experience a variation in their composition because of a departure (for a domestic destination) of a member other than the migrant: over the entire sample, the probability of losing a member for migrant households stands at 21.0 percent, compared to 17.0 percent for non-migrant households. However, and differently from what happens in Table 3, the inclusion of the household controls changes the picture. Notably, the probability of losing one member (intuitively) increases with the initial size of the household, and migrant households

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[35]The vector of household characteristics includes dummies related to household size, the number of children below the age of 5, the number of children between 6 and 14, the number of household members aged above 65, and the highest educational attainment of household member; instead of assuming linear effects of these household variables, we include in the vector of regressors a dummy for each of the values taken by these variables, e.g., a dummy for households with four members.

[36]There are 934 municipalities in the rural sample, with 45 households per municipality on average, and 389 municipalities in the urban sample, with 268 households per municipality on average in the 12 rounds of the ENOE survey that we use for the analysis.

Table 3: Migrant households and new members

| | | Dependent variable: N_j | | |
| | | Specification | | |
	(1)	(2)	(3)	(4)
		Panel A - Entire sample		
Migrant household	0.054***	0.053***	0.043***	0.043***
	(0.005)	(0.005)	(0.005)	(0.005)
Adjusted-R^2	0.00	0.02	0.01	0.03
Observations	147,288	147,288	147,288	147,288
F-test household controls			58.091	59.504
Average non-migrant	0.109	0.109	0.109	0.109
		Panel B - Urban areas		
Migrant household	0.082***	0.085***	0.071***	0.074***
	(0.007)	(0.007)	(0.007)	(0.007)
Adjusted-R^2	0.00	0.01	0.01	0.02
Observations	104,351	104,351	104,351	104,351
F-test household controls			48.819	51.494
Average non-migrant	0.107	0.107	0.107	0.107
		Panel C - Rural areas		
Migrant household	0.022***	0.016**	0.013*	0.006
	(0.007)	(0.008)	(0.007)	(0.008)
Adjusted-R^2	0.00	0.02	0.01	0.03
Observations	42,937	42,937	42,937	42,937
F-test household controls			14.093	14.500
Average non-migrant	0.116	0.116	0.116	0.116
Household controls	No	No	Yes	Yes
Municipality FE	No	Yes	No	Yes

Notes: ***, ** and * denote significance at the 1, 5 and 10 percent level respectively; the
F-test is performed on the null hypothesis that the coefficients of all household controls
are jointly zero; the household controls are measured at the time of the first interview.
Source: Authors' elaboration on ENOE, 2005Q1-2007Q4.

Table 4: Migrant households and leaving members

| | | Dependent variable: L_j | | |
| | | Specification | | |
	(1)	(2)	(3)	(4)
		Panel A - Entire sample		
Migrant household	0.040***	0.046***	-0.026***	-0.023***
	(0.006)	(0.006)	(0.006)	(0.006)
Adjusted-R^2	0.00	0.01	0.10	0.11
Observations	147,288	147,288	147,288	147,288
F-test household controls			618.422	631.045
Average non-migrant	0.170	0.170	0.170	0.170
		Panel B - Urban areas		
Migrant household	0.051***	0.056***	-0.017**	-0.014*
	(0.008)	(0.008)	(0.008)	(0.008)
Adjusted-R^2	0.00	0.01	0.09	0.10
Observations	104,351	104,351	104,351	104,351
F-test household controls			417.583	429.411
Average non-migrant	0.107	0.107	0.107	0.107
		Panel C - Rural areas		
Migrant household	0.025***	0.036***	-0.038***	-0.035***
	(0.009)	(0.009)	(0.008)	(0.009)
Adjusted-R^2	0.00	0.03	0.11	0.14
Observations	42,937	42,937	42,937	42,937
F-test household controls			207.321	209.661
Average non-migrant	0.176	0.176	0.176	0.176
Household controls	No	No	Yes	Yes
Municipality FE	No	Yes	No	Yes

Notes: ***, ** and * denote significance at the 1, 5 and 10 percent level respectively; the F-test is performed on the null hypothesis that the coefficients of all household controls are jointly zero; the household controls are measured at the time of the first interview. Source: Authors' elaboration on ENOE, 2005Q1-2007Q4.

are significantly larger than non-migrant households (see Table 1). Once we control for the initial difference in size, as well as for all other household characteristics, migrant households appear to have a significantly lower probability of losing one (more) of their members. Here, it is important to recall that all the specifications are estimated on the sub-sample of households that are interviewed for all five quarters, so that Table 4 is informative about the correlates of losing one member conditional upon *not* losing all its members.[37] If a household dissolves by losing all its members, then this gives rise to attrition out of the ENOE sample, and the household is thus dropped out of the estimation whose results are reported in Table 4.

3.2 Migration and attrition

We thus analyze whether the results reported in Table 4 are partly due to the estimation on the sample of non-attrited households, as there could be a differential probability of attrition between migrant and non-migrant due to a differential incidence of household dissolution.[38] In order to answer this question, we cannot rely, as we do in Tables 4 and 3, on a collapse of the longitudinal dimension of the ENOE, as the longer a household is included in the ENOE sample, the higher the probability to observe a migration episode, thus creating a spurious negative correlation between the migration status and attrition (see Table 1).[39] We thus exploit the panel dimension of the data, estimating the following specification:

$$A_{jms} = \gamma M_{jms} + \phi' \mathbf{x}_{jm}^1 + d_s + d_m + \epsilon_{jms} \ \text{ if } s = 2, 3, 4.$$

where A_{jms} is a binary variable taking the value of 1 if household j residing in the municipality m drops out of the sample after the interview s, with $s = 2, 3, 4$, and M_{jms} is a binary variable taking the value of 1 if the household reports a migration episode that has occurred before the interview s. As migration cannot be observed before the first interview by definition, we restrict the sample to the second, third and fourth interview (excluding the final fifth interview since households are not tracked after). We include interview fixed effects d_s,

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[37]Clearly, the same remark applies to the estimates reported in Table 3, but there attrition is unlikely to be more frequent among households experiencing the arrival of a new member.

[38]Household dissolution is only one of the possible determinants of attrition: the ENOE, as most panel surveys, tracks housing units, so that a household that, say, moves in a different flat in the same town would drop out of the sample.

[39]Similarly, as migration episodes can be reported only starting from the second interview, all instances of attrition between the first and the second interview relate households that we classify as non-migrant.

Table 5: Migrant households and attrition

| | Dependent variable: A_{js} | | | |
| | Specification | | | |
	(1)	(2)	(3)	(4)
	Panel A - Entire sample			
Migrant household (M_{js})	-0.006	0.004	0.008**	0.016***
	(0.004)	(0.004)	(0.004)	(0.004)
Adjusted-R^2	0.01	0.03	0.03	0.04
Observations	464,302	464,302	464,302	464,302
F-test household controls			137.448	127.532
Average non-migrant	0.068	0.068	0.068	0.068
	Panel B - Urban areas			
Migrant household (M_{js})	0.002	0.005	0.016***	0.018***
	(0.006)	(0.006)	(0.006)	(0.006)
Adjusted-R^2	0.01	0.02	0.03	0.04
Observations	331,010	331,010	331,010	331,010
F-test household controls			114.008	108.947
Average non-migrant	0.075	0.075	0.075	0.075
	Panel C - Rural areas			
Migrant household (M_{js})	-0.005	0.003	0.004	0.011**
	(0.005)	(0.005)	(0.005)	(0.005)
Adjusted-R^2	0.01	0.05	0.02	0.06
Observations	133,292	133,292	133,292	133,292
F-test household controls			38.042	22.035
Average non-migrant	0.050	0.050	0.050	0.050
Household controls	No	No	Yes	Yes
Municipality FE	No	Yes	No	Yes

Notes: ***, ** and * denote significance at the 1, 5 and 10 percent level respectively; standard errors clustered at the household level; A_{js} is a dummy variable taking the value of 1 if household j is in the ENOE sample in the interview s, with $s = 2, 3, 4$, but not complete the last interview; the dummy variable M_{js} takes the value of 1 if the household j reports a migration episode that has occurred before the interview s; the variable the F-test is performed on the null hypothesis that the coefficients of all household controls are jointly zero; household controls measured at the the first interview.
Source: Authors' elaboration on ENOE, 2005Q1-2007Q4.

Table 6: Receipt of remittances (end of period), new members and migration rate

| | Dependent variable: r_j^5 | | |
	Non-migrant households (with $r_j^1 = 0$)		
High-migration municipality (dummy)	0.0168***	0.0058***	0.0046**
	(0.0014)	(0.0019)	(0.0019)
New member joining ($N_j = 1$)	0.0095***	0.0080***	0.0092***
	(0.0029)	(0.0029)	(0.0029)
High-migration municipality*New member joining	0.0196***	0.0195***	0.0191***
	(0.0043)	(0.0043)	(0.0043)
Household controls	No	No	Yes
State FE	No	Yes	Yes
Adjusted-R^2	0.01	0.01	0.02
Observations	50,335	50,335	50,335
F-test controls			15.031
Average $R_j^5 \vert N_j = 0$ for low-migration municipality	0.013	0.013	0.013
Average $R_j^5 \vert N_j = 1$ for high-migration municipality	0.059	0.059	0.059

Notes: ***, ** and * denote significance at the 1, 5 and 10 percent level respectively; the sample is restricted to non-migrant households that were not receiving remittances household controls measured at the the first interview.

Source: Authors' elaboration on ENOE, 2005Q1-2006Q2.

municipal dummies d_m and a vector of initial household characteristics $\mathbf{x}_{jm}^1$. Standard errors are clustered at the household level to allow for serial correlations of the error terms ϵ_{jms} across interviews for the same household.

The results in Table 5 reveal that the probability of attrition is significantly higher for migrant households once we control for initial household characteristics. Over the entire sample, the probability of attrition for migrant households is 1.6 percentage points (i.e., 23.5 percent) higher than for non-migrant households, with no major differences between urban and rural areas in this respect.

3.3 Remittances receipt in non-migrant households

A possible joint interpretation of the results in Tables 4 and 5 is that migrant households are less likely to undergo marginal changes in their composition due to the departure of an additional member, while they are more likely to experience an extreme reduction in

their size, with the departure of all its members and the ensuing household dissolution. So far, this is just a conjecture, as other explanations are also conceivable, such as whole household migration.[40] In order to test this conjecture, we rely on the question on the ENOE related to the receipt of remittances from abroad over a three-month recall period before each interview.[41] Our reasoning goes as follows: if the differential attrition that we observe for migrant households is due to household dissolution, then the remittances sent from the migrants at the end of the period of analysis should be directed towards households that do *not* report any migration episode in the ENOE, but that have received new members, coming from the (dissolved) household of origin of the migrant. Furthermore, if the individuals that come from a dissolved household of origin of the migrant join another household that lives in the same municipality, then the effect of receiving a new member on the probability of starting to receive remittances from abroad should be higher for non-migrant households living in high-migration municipalities.[42]

We thus estimate the following regression on the sub-sample of non-migrant households that were not receiving remittances from abroad in the first interview, i.e., $M_{jm} = 0$ and $r_{jm}^1 = 0$:

$$r_{jm}^5 = \alpha_1 N_{jm} + \alpha_2 d_m^{high} + \alpha_3 N_{jm} * d_m^{high} + \phi' \mathbf{x}_{jm}^1 + d_r + \epsilon_{jm} \qquad (1)$$

where r_{jm}^5 is a dummy variable taking the value of 1 if household j residing in municipality m reports receiving remittances from abroad in the fifth interview, d_m^{high} is a dummy that takes the value of 1 is the migration rate (measured from the ENOE) for municipality m is above the median, and d_r is a dummy for each Mexican state. The results are reported in Table 6 for the entire sample: the likelihood of receiving remittances by the fifth interview (conditional upon not receiving them in the first interview) increases if the household has received at least

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[40]Notice that whole household migration cannot in this case be due to the simultaneous migration of all household members, as otherwise no migration episode would have been reported in the ENOE, and whole household migration would have rather given rise to the attrition of a (for us) non-migrant household.

[41]The ENOE contains the question on the receipt of remittances from 2005Q1 to 2006Q2; we can thus only use in the estimation the households initially interviewed between 2005Q1 and 2005Q3 (for the latter, we have to use the receipt of remittances at the fourth interview; this is done to increase the sample size).

[42]This empirical test is quite demanding, as migrants might experience initial spell of unemployment at destination, that prevent them from starting to send remittances back home at the beginning of their migration experience; still, migrant networks at destination contribute to facilitate the integration of new migrants on the labor market at destination (Munshi, 2003), and household dissolution might occur in correspondence not to the first instance in which the migrant moves to the United States.

one new member, and this effect is magnified in high-migration municipalities.[43] The share of non-migrant households that receive remittances in the fifth interview stands at 5.9 percent for those that receive a new member and that reside in a high-migration municipalities, more than three times higher than the corresponding share for households without new members residing in low-migration municipalities. The association between the receipt of remittances and the arrival of (at least) a new member in a non-migrant household is consistent with our conjecture that these individuals are coming from households of origin of the migrants that dissolved.[44]

Migrant households represent less than 3 percent of the households in our sample, and Table 5 evidences a highly statistically significant difference in the probability of attrition with respect to non-migrant households, but which is small in size, i.e., 1.6 percentage points. How can we then reconcile the ensuing low incidence of household dissolution related to migration that comes out of the analysis of the ENOE data with the evidence presented in Table 6? The dissolution of the household of origin of the migrants results in the attrition of a migrant household only if the dissolution occurs after the interview in which a household member is reported to having moved abroad. If migration and household dissolution both occurred in between two interviews, then this would result, according to the definitions introduced in Section 2.2, in the attrition of a non-migrant household. The systematic association between migration and variations in co-residence choices that emerges from the ENOE dataset induces an undercount of migration episodes, that determines our inability to correctly identify all the instances in which the household of origin of the migrant dissolves. Thus, the incidence of household dissolution could be larger than the one implied by the attrition of migrant households, and this could explain our ability to identify a significant (and large) association between the arrival of a new member in a non-migrant household in high-migration municipalities and the receipt of remittances reported in the last interview.

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[43]Estimates on the urban and rural sub-sample of non-migrant households are presented in Table A.2 in the Appendix.

[44]The interaction between receiving a new member and residing in a high-migration municipality is highly statistically significant for the urban sub-sample, while it is still positive but not significant for the rural subsample; members leaving a dissolved household could more frequently move out of the municipality of origin in rural than in urban areas, given the smaller size of the municipality, and this would explain the lack of significance of the interaction term in Panel B of Table A.2.

3.4 New and old members in migrant households

Section 3.1 has evidenced that migrant households are 39.4 percent more likely to receive (at least) one new member. It is then interesting to compare the characteristics of the individuals that were included in the household roster before the first interview, with those of the individuals that entered into the household roster in a later interview.[45] Table 7 compares the age, gender, education and relationship to the household head of new members with those of the other members in migrant households, for the entire sample and separately for urban and rural households.[46]

Individuals aged 18 to 35 represent 24 percent of the members appearing in the household roster in the first interview, while they represent 47 percent of new members. Children aged 0 to 2 represent 6 percent of the household members in the first interview, but 11 percent of new members.[47] Similarly, the household head, the head's spouse, sons and daughters account for 85 percent of the individuals in the initial roster, but just 35 percent of new members, while grandsons (24 percent), sons or daughters in law (13 percent) and brothers or sisters in law (11 percent) are greatly overrepresented among new members. No major differences emerge from Table 7 with respect to the education of the two groups of household members.[48]

The picture that emerges from Table 7 suggests that the variations in co-residence choices that are associated with migration tend to transform migrant households into non-nuclear households, with the new members having more distant family ties with the household head. For instance, the migration of the son of the household head can be associated with the inclusion in the household of another son of the household head (together with his spouse and children), or the migrant might move in his parents' household with his spouse and

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[45]We could conduct a similar comparison with the individuals that left the household (for a domestic destination), but the evidence provided in Section 3.2 suggests that we are unable to identify all these individuals because of household dissolution.

[46]Household headship is defined in the first interview, and it then remains unchanged over the following four quarters; new members can appear as being household heads if the household head (by definition included in the household roster in the first interview) temporarily leaves the household and then comes back; this occurs for just 3 percent of the new members.

[47]Recall that newborn babies are *not* included in the definition of new members, so these children have not joined the household at the time of their birth.

[48]The male new members aged 18 to 35 appear slightly less educated than the other male members in the same age group.

Table 7: Characteristics of non-migrant members in migrant households

Household members	Present at $s = 1$	New members	
Demographic characteristics			
Age 0-2	0.06	0.11	0.06***
Age 3-8	0.14	0.11	−0.03**
Age 9-17	0.25	0.16	−0.09***
Male 18-35	0.08	0.22	0.13***
Female 18-35	0.16	0.25	0.09***
Male 36-60	0.09	0.09	−0.00
Female 36-60	0.19	0.07	−0.12***
Male 60 or more	0.03	0.02	−0.01
Female 60 or more	0.03	0.02	−0.01
Education			
Years education (age 15 and above)	7.55	8.24	0.69***
Years education, male 18-35	9.86	9.08	−0.78**
Years education, female 18-35	8.95	9.28	0.32
Years education, male 36-60	7.15	7.74	0.59
Years education, female 36-60	6.66	6.85	0.19
Years education, male 60 or more	3.86	2.48	−1.38
Years education, female 60 or more	3.34	2.44	−0.90
Relationship to household head			
Head	0.16	0.03	−0.13***
Spouse	0.18	0.04	−0.14***
Son or daughter	0.51	0.28	−0.23***
Non-relatives	0.00	0.04	0.03***
Parent, grand-parent, uncle and aunt	0.01	0.03	0.02***
Siblings	0.01	0.04	0.03***
Grandson	0.08	0.24	0.16***
Nephew	0.01	0.08	0.07***
Cousin	0.00	0.01	0.01***
Spouse's parent	0.00	0.02	0.02***
Son's parent in law	0.00	0.00	0.00
Son or daughter in law	0.02	0.13	0.11***
Brother or sister in law	0.01	0.05	0.04***
Observations	15,736	1,190	16,926

Notes: ***, ** and * denote significance at the 1, 5 and 10 percent level respectively; we divide non-migrant members in migrant households depending on whether they were already included in the roster in the first interview, or they joined the household later; the identity of the household head is defined in the first interview, and it then remains unchanged over time.

Source: Authors' elaboration on ENOE, 2005Q1-2007Q4.

children shortly after migrating.[49] The looser familial ties among the members of the migrant households could have implications for the intra-household allocation of resources (Kazianga and Wahhaj, 2017), and hence for household outcomes.

4   Concluding remarks

Co-residence choices represent an under-studied topic in the economic literature, where household composition is mostly treated as exogenous with respect to the object of the analysis. The migration literature makes no exception in this respect, as it relies on the assumption that the migration of a household member is not systematically associated with further variations in co-residence choices. Our analysis of the data drawn from the 2005Q1 to 2007Q4 rounds of the *Encuesta Nacional de Ocupación y Empleo* reveals that this assumption lacks empirical plausibility, at least in the case of Mexico.

Households that report an international migration episode experience further variations in their composition: migrant households are 39 percent more likely than non-migrant households to receive one new member over a one-year period around the migration episode. While they are less likely to experience a further reduction at the margin in their size (over and above the one induced by migration), they are 24 percent more likely to drop out of the sample. Attrition appears to be due to household dissolution, with all the remaining members leaving the household of origin of the migrant and joining another household. This interpretation is supported by a set of auxiliary results on the receipt of remittances by non-migrant households.

The endogeneity of co-residence choices has major implications both for survey-based collection of data on migrants in their countries of origin, and for the economic analysis of the determinants and effects of international migration.[50] The restrictions introduced in the retrospective questions about migration episodes to avoid a double-counting appear to introduce a substantial risk of under-counting. The analysis of the determinants of intra-household selection into migration and of the effects of migration on the individuals left behind should also take into account the fact that the partition of family members into

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[49]In 8.90 percent of the cases, the migrant joins the household shortly before moving abroad, possibly together with other individuals.

[50]The variations in co-residence choices need not to occur all on impact, so that some of them might take place beyond the limited time period covered by the ENOE survey for each household.

distinct households appears to be reshuffled by migration. A better understanding of the determinants and effects of migration could require an effort to collect family-level rather than household-level data.

References

ALCARAZ, C., CHIQUIAR, D. and SALCEDO, A. (2012). Remittances, schooling, and child labor in Mexico. *Journal of Development Economics*, **97** (1), 156–165.

ANGELUCCI, M. (2015). Migration and financial constraints: Evidence from Mexico. *Review of Economics and Statistics*, **97** (1), 224–228.

—, DE GIORGI, G., RANGEL, M. A. and RASUL, I. (2010). Family networks and school enrollment: Evidence from a randomized social experiment. *Journal of Public Economics*, **94** (3), 197–221.

—, — and RASUL, I. (2017). Consumption and investment in resource pooling family networks. *The Economic Journal*, forthcoming.

ASHRAF, N., AYCINENA, D., MARTÍNEZ A, C. and YANG, D. (2015). Savings in transnational households: a field experiment among migrants from El Salvador. *Review of Economics and Statistics*, **97** (2), 332–351.

BARSBAI, T. and THIELE, R. (2013). Does prime-age mortality reduce per-capita household income? evidence from rural Zambia. *World Development*, **45**, 51–62.

BATISTA, C., LACUESTA, A. and VICENTE, P. (2012). Testing the 'brain gain' hypothesis: Micro evidence from Cape Verde. *Journal of Development Economics*, **97** (1), 32–45.

BERTOLI, S. and MARCHETTA, F. (2014). Migration, remittances and poverty in Ecuador. *The Journal of Development Studies*, **50** (8), 1067–1089.

CHORT, I. and DE LA RUPELLE, M. (2016). Determinants of Mexico-U.S. outward and return migration flows: A state-level panel data analysis. *Demography*, **53** (5), 1453–1476.

— and SENNE, J.-N. (2015). Selection into migration within a household model: Evidence from Senegal. *The World Bank Economic Review*, **29**, S247–S256.

— and — (2017). You'll be a migrant my son: Accounting for migrant selection within the household. *Economic Development and Cultural Change*, forthcoming.

Dustmann, C., Fasani, F., Meng, F. and Minale, L. (2017). Risk attitudes and household migration decisions.

Foster, A. D. and Rosenzweig, M. R. (2002). Household division and rural economic growth. *The Review of Economic Studies*, **69** (4), 839–869.

Gibson, J., McKenzie, D. J. and Stillman, S. (2011). The impacts of international migration on remaining household members: omnibus results from a migration lottery program. *Review of Economics and Statistics*, **93** (4), 1297–1318.

Hamoudi, A. and Thomas, D. (2014). Endogenous coresidence and program incidence: South Africa's old age pension. *Journal of Development Economics*, **109**, 30–37.

Ibarraran, P. and Lubotsky, D. (2007). Mexican immigration and self-selection: New evidence from the 2000 Mexican census. In G. J. Borjas (ed.), *Mexican immigration to the United States*, pp. 159–192.

Kazianga, H. and Wahhaj, Z. (2017). Intra-household resource allocation and familial ties. *Journal of Development Economics*, **127**, 109–132.

LaFave, D. and Thomas, D. (2017). Extended families and child well-being. *Journal of Development Economics*, **126**, 52–65.

McKenzie, D. J. (2003). How do households cope with aggregate shocks? evidence from the Mexican peso crisis. *World Development*, **31** (7), 1179–1199.

Mishra, P. (2007). Emigration and wages in source countries: Evidence from Mexico. *Journal of Development Economics*, **82** (1), 180–199.

Monras, J. (2015). Immigration and wage dynamics: Evidence from the Mexican peso crisis, mimeo.

Munshi, K. (2003). Networks in the modern economy: Mexican migrants in the US labor market. *The Quarterly Journal of Economics*, **118** (2), 549–599.

MURARD, E. (2015). The impact of migration on family left behind: estimation in presence of intra-household selection of migrants, mimeo.

POIRINE, B. (1997). A theory of remittances as an implicit family loan arrangement. *World Development*, **25** (4), 589–611.

ROSENZWEIG, M. and ZHANG, J. (2014). Co-residence, life-cycle savings and inter-generational support in urban China, working Paper No. 20057, National Bureau of Economic Research.

SJAASTAD, L. A. (1962). The costs and returns of human migration. *Journal of Political Economy*, **70** (5), 80–93.

STARK, O. and BLOOM, D. E. (1985). The new economics of labor migration. *American Economic Review*, **75** (2), 173–178.

STEINMAYR, A. (2015). When a random sample is not random. bounds on the effect of migration on children left behind, mimeo.

TERUEL, G., RUBALCAVA, L. and ARENAS, E. (2012). Migration in the Mexican Family Life Survey. In A. Cuecuecha and C. Pederzini (eds.), *Migration and Remittances from Mexico: Trends, Impacts, and New Challenges*, Lexington Books, pp. 15–36.

WONG, R., RESANO, E. and MARTÍNEZ, I. (2006). *Una Costante Cambiante: La Migración De La Población Mexicana hacia los Estados Unidos de Norteamérica*. Zapopano.

YANG, D. (2008). International migration, remittances and household investment: Evidence from Philippine migrants exchange rate shocks. *The Economic Journal*, **118** (528), 591–630.

A Appendix

Table A.1: Dataset structure

	Interview					
	1	2	3	4	5	Total
Quarter						
2005 Q1	20,919	0	0	0	0	20,919
2005 Q2	21,114	19,534	0	0	0	40,648
2005 Q3	21,189	19,581	18,803	0	0	59,573
2005 Q4	21,088	19,769	19,044	18,331	0	78,232
2006 Q1	21,534	19,853	19,210	18,652	18,201	97,450
2006 Q2	21,444	20,251	19,168	18,643	18,244	97,750
2006 Q3	21,508	20,108	19,468	18,597	18,343	98,024
2006 Q4	21,510	20,189	19,440	18,973	18,239	98,351
2007 Q1	0	20,303	19,683	19,009	18,728	77,723
2007 Q2	0	0	19,612	19,149	18,624	57,385
2007 Q3	0	0	0	18,932	18,662	37,594
2007 Q4	0	0	0	0	18,247	18,247
Total	170,306	159,588	154,428	150,286	147,288	781,896

Source: Authors' elaboration on ENOE, 2005Q1-2007Q4.

Table A.2: Receipt of remittances (end of period), new members and migration rate

<div align="right">

Dependent variable: r_j^5

Non-migrant households (with $r_j^1 = 0$)

</div>

	Panel A - Urban areas		
High-migration municipality (dummy)	0.0076***	-0.0015	-0.0016
	(0.0014)	(0.0021)	(0.0021)
New member joining ($N_j = 1$)	0.0060**	0.0057**	0.0047*
	(0.0028)	(0.0028)	(0.0028)
High-migration municipality*New member joining	0.0196***	0.0195***	0.0192***
	(0.0043)	(0.0043)	(0.0043)
Adjusted-R^2	0.01	0.01	0.03
Observations	36,489	36,489	36,489
F-test controls			6.520
Average $R_j^5|N_j = 0$ for low-migration municipality	0.011	0.011	0.011
Average $R_j^5|N_j = 1$ for high-migration municipality	0.045	0.045	0.045

	Panel B - Rural areas		
High-migration municipality (dummy)	0.0390***	0.0170***	0.0156***
	(0.0036)	(0.0043)	(0.0043)
New member joining ($N_j = 1$)	0.0190**	0.0187**	0.0183**
	(0.0075)	(0.0075)	(0.0075)
High-migration municipality*New member joining	0.0111	0.0116	0.0122
	(0.0108)	(0.0108)	(0.0107)
Adjusted-R^2	0.01	0.03	0.03
Observations	13,846	13,846	13,846
F-test controls			4.029
Average $R_j^5|N_j = 0$ for low-migration municipality	0.020	0.020	0.020
Average $R_j^5|N_j = 1$ for high-migration municipality	0.089	0.089	0.089
Household controls	No	No	Yes
State FE	No	Yes	Yes

Notes: ***, ** and * denote significance at the 1, 5 and 10 percent level respectively; the sample is restricted to non-migrant households that were not receiving remittances household controls measured at the the first interview.

Source: Authors' elaboration on ENOE, 2005Q1-2006Q2.

Table A.3: Characteristics of non-migrant members in migrant households

Household members	Rural areas			Urban areas		
	Present at $s = 1$	New members		Present at $s = 1$	New members	
Demographic characteristics						
Age 0-2	0.06	0.12	0.06***	0.05	0.11	0.06***
Age 3-8	0.16	0.11	−0.05**	0.12	0.12	−0.01
Age 9-17	0.28	0.17	−0.11***	0.21	0.15	−0.07***
Male 18-35	0.06	0.20	0.14***	0.11	0.22	0.11***
Female 18-35	0.16	0.27	0.11***	0.17	0.24	0.07***
Male 36-60	0.08	0.08	−0.00	0.10	0.09	−0.01
Female 36-60	0.18	0.06	−0.12***	0.21	0.09	−0.13***
Male 60 or more	0.03	0.01	−0.02*	0.03	0.03	−0.00
Female 60 or more	0.03	0.01	−0.02*	0.03	0.03	−0.01
Education						
Years education (age 15 and above)	6.15	7.38	1.23***	8.88	8.79	−0.10
Years education, male 18-35	8.55	7.69	−0.86*	10.64	9.93	−0.71*
Years education, female 18-35	7.88	8.51	0.62	10.07	9.86	−0.22
Years education, male 36-60	5.01	5.40	0.39	9.10	9.13	0.04
Years education, female 36-60	5.13	6.25	1.12	8.12	7.13	−0.99
Years education, male 60 or more	2.26	1.14	−1.12	5.84	3.00	−2.84*
Years education, female 60 or more	2.05	2.67	0.62	4.57	2.38	−2.19*
Relationship to household head						
Head	0.14	0.03	−0.12***	0.18	0.03	−0.15***
Spouse	0.19	0.05	−0.14***	0.17	0.04	−0.13***
Son or daughter	0.54	0.30	−0.24***	0.48	0.27	−0.21***
Non-relatives	0.00	0.03	0.03***	0.00	0.04	0.04***
Parent, grand-parent, uncle and aunt	0.01	0.01	0.01	0.01	0.04	0.03***
Siblings	0.01	0.04	0.03***	0.01	0.04	0.03***
Grandson	0.08	0.25	0.18***	0.09	0.24	0.15***
Nephew	0.01	0.06	0.05***	0.01	0.10	0.09***
Cousin	0.00	0.01	0.01***	0.00	0.01	0.01***
Spouse's parent	0.00	0.01	0.01***	0.00	0.03	0.02***
Son's parent in law	0.00	0.00	−0.00	0.00	0.00	0.00
Son or daughter in law	0.02	0.17	0.15***	0.03	0.11	0.08***
Brother or sister in law	0.00	0.04	0.03***	0.01	0.06	0.05***
Observations	8,332	480	8,812	7,404	710	8,114

Notes: ***, ** and * denote significance at the 1, 5 and 10 percent level respectively; we divide non-migrant members in migrant households depending on whether they were already included in the roster in the first interview, or they joined the household later; the identity of the household head is defined in the first interview, and it then remains unchanged over time.

Source: Authors' elaboration on ENOE, 2005Q1-2007Q4.