Migration and co-residence choices: Evidence from Mexico

Simone Bertoli, Elie Murard

Migration and co-residence choices: Evidence from Mexico*

Simone Bertoli[a] and Elie Murard[b]

[a] *CERDI, Université Clermont Auvergne, CNRS and IZA*†

[b] *IZA*‡

Abstract

The migration literature typically assumes that the migration of a household member is not associated with further variations in co-residence choices. We rely on a Mexican panel survey to provide novel evidence on the correlation between the occurrence of an international migration episode and changes in household composition. Migrant households have a higher probability of receiving a new member within one year around the migration episode. Attrition is significantly higher among migrant households, and we provide evidence that this is partly due to the dissolution of the household of origin of the migrant. The endogeneity of co-residence choices induces an undercount of migration episodes, as shown with data from the 2000 Census. This has implications for the analysis of migrant selection and of the effects on the individuals left behind. Dealing with these analytical challenges requires an approach to data collection that is less dependent on variations in household composition.

Keywords: International migration; household composition; data collection; remittances.

*The Authors are grateful to the Editor-in-Chief Andrew Foster, to the Guest Editor Hillel Rapoport, and to three anonymous referees for their insightful comments and suggestions, to Catia Batista, Isabelle Chort, Jesús Fernández-Huertas Moraga, Flore Gubert, Francesca Marchetta, Biagio Speciale, Gregory Verdugo, Jackie Wahba and to the participants to seminar presentations at NOVA School of Business and Economics, PSE, IZA, CERDI, SALDRU (University of Cape Town), University of Florence, IRES (Université catholique de Louvain), at the Workshop on the Economics of Migration at the University of Southampton, and at the 10^{th} Conference on Migration and Development for their comments. They also express their gratitude to the INEGI for providing additional data derived from the 2000 Mexican Population Census; Simone Bertoli acknowledges the support received from the *Agence Nationale de la Recherche* of the French government through the program "*Investissements d'avenir*" (ANR-10-LABX-14-01); the usual disclaimers apply.

†CERDI, Avenue Léon-Blum, 26, F-63000, Clermont-Ferrand; email: simone.bertoli@uca.fr.

‡IZA, Schaumburg-Lippe-Strasse 5-9, D-53113, Bonn; email: murard@iza.org.

"Household structure is pervasively treated as an exogenous or fixed characteristics."
(Foster and Rosenzweig, 2002, p. 839)

1 Introduction

Surveys 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 a large fraction of households have a non-nuclear structure. A violation of this assumption would entail that some migration episodes simply go unrecorded, and it would also have relevant analytical implications.

Consider, for instance, the phrasing of the question included in the long form of 2000 Mexican Population Census, which is representative of the questions that are used to elicit information on past migration episodes:[2]

> "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 type of retrospective question are relied upon to obtain an origin-based measurement of migration flows, and to analyze the prevailing pattern of migrant selection (see, for instance, McKenzie and Rapoport, 2010).[3] Furthermore, the members of the household reporting a migration episode are as-

[1] Gibson et al. (2011) represent a notable exception in this respect, as concerns the empirical plausibility of this assumption are dealt with at p. 1302.

[2] UNDESA (2017) observes that "[A] significant number of countries attempt to collect data on emigration through a short module of questions [...] In the 2010 round of censuses, 35 of the 119 censuses examined include a short emigration module. All 35 are from less developed regions." (p. 75); see https://unstats.un.org/unsd/demographic/sources/census/censusquest.htm for the questionnaires used in the 2010 round of censuses.

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

sumed to constitute the group of individuals the migrant was co-residing with at the time of migration. This reconstruction of the 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, 2018; 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 households that these individuals joined (or formed) should *not* report any migration episode, as only the household that the migrant was living in at the time of migration should report it.[4] This also entails that a migration episode might remain unrecorded if the household of origin of the migrant has dissolved.[5] The non-reporting of migration episodes would pose an important threat to the analysis of migrant selection and of the effects of migration on those left behind, as treated individuals would be incorrectly regarded as untreated.

Why should one expect migration to be systematically associated with further changes in co-residence choices of the individuals left behind?[6] 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 can extend beyond the household.[7] International

[4]The following follow-up question, which is asked separately for each migrant, clarifies that the residency condition refers to the time of migration: "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, which is consistent with the best practices described by UNDESA (2017), is introduced to avoid the double-counting problem that would arise if the migrant had belonged to more than one household before leaving the country (see INEGI, *XII Censo General de Población y Vivienda 2000. Marco Conceptual*, p. 50).

[5]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.

[6]These arguments apply to any migration episode; we retain a focus on international migrants as, differently from domestic migrants, "emigrants are demographically similar to deaths in that information on the people involved cannot be obtained directly from them because they are not living within national boundaries at the time the census is taken" (p. 74).

[7]"[M]igration decisions are not made by isolated individual actors, but by larger units of related people–typically families or households." (Massey *et al.*, 1993, p. 436).

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 relatives can help overcoming liquidity constraints, thus allowing to undertake the (lumpy) investment in international migration. 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 non-unitary models of intra-household decision, international migration can lead to a reduction of the bargaining power of the migrant (Chen, 2006, 2013; Ambler, 2015; Clemens and Tiongson, 2017), and new household members could represent a monitoring device reducing the informational asymmetries to which the migrant is exposed to (de Laat, 2014; Ashraf et al., 2015).[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*) Do we observe a dissolution of the households of origin of the migrants, with all the members left behind joining another household within their family network? (*iii*) Do variations in co-residence choices exert a significant influence on the data collected from retrospective questions to proxy respondents? 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. Indeed, the anthropological work by Boehm (2012) reports a number of cases of Mexican women that were co-residing with their parents or parents-in-law after their husbands have moved to the United States.

Addressing the first two proposed research questions requires having access to panel data that 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

[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 to the need to replace the migrant in family-run agricultural activities in rural areas.

[9]For instance, having the spouse left behind co-residing 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.

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. The ENOE is a short rotating panel survey where each household, which is defined as a group of individuals that live in the same dwelling space and share food expenditures, is followed over five consecutive quarters. This survey allows detecting 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 2.3 percent of the 170,306 households in the sample that we use for the empirical analysis, and a similar number of international migrants originates from urban and from rural areas. 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. Thus, 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.

Once we control for initial differences in the demographic structure of the households, 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 34.5 percent higher than for non-migrant households, with new members arriving either at the time of migration or in the following two quarters. Migrant households are significantly less likely to lose one more of their members, and they face a probability of attrition that is 26.8 percent higher than non-migrant households. The relationship between the occurrence of a migration episode and either the arrival of a new member or attrition is stronger for urban households, and when the migrant is a woman.[10]

The dissolution of the households of origin of the migrants is a possible candidate for the estimated difference in the probability of attrition. Specifically, the data reveal that the probability that a non-migrant household reports receiving remittances from abroad is positively associated with the earlier arrival of a new member, and that such an effect is stronger in high-migration municipalities. This provides suggestive evidence that some households of origin of the migrants have actually dissolved, and their members have joined

[10]The empirical evidence that we provide is contingent on the definition of household adopted in the ENOE, as different definitions could not just result in a different household composition (Beaman and Dillon, 2012), but potentially also in a different relationship between migration and variations in co-residence choices.

another household in their family network, with this household starting to receive remittances from abroad. The availability of individual-level information on the receipt of remittances in the ENOE allows us to show that this effect is entirely due to the remittances received by the new members, and not by the members initially present in the household roster.

We draw on the data from the extended questionnaire of the 2000 Mexican Population Census, which adopted the same definition of household as the ENOE, for addressing the third research question. We identify a group of women whose husbands are likely to be residing in the United States at the time of survey.[11] Then, we analyze whether their (likely) husbands belong to the set of current migrants whose migration episodes are reported by each household. Variations in co-residence choices occurring after the migration of their husbands should reduce the likelihood that both the woman is identified as the household head, and that her husband meets the residency condition. If this condition is not satisfied, then the migration episode remains unrecorded. 57.1 percent of the 21,841 women in this sample have their husband listed as a current migrant, but the corresponding share for women that are not household heads, and are thus more likely to have experienced a variation in their co-residence choices, is only half of the one observed for women that are household heads. Thus, data collection through retrospective questions on the occurrence of migration episodes in the 2000 Mexican Population Census is exposed to a significant undercount because of the systematic association between migration and further variations in household composition.

Our paper makes three distinct contributions to the existing literature. First, it provides quantitative evidence on the endogeneity of co-residence choices with respect to migration for Mexico, a major migrant-sending country, and it documents the ensuing implications for data collection through state-of-the-art retrospective questions on migration. Second, it discusses the analytical challenges related to this endogeneity. Variations in household composition, and the ensuing non-reporting of migration episodes, have implications for the analysis of migrant selection that are close to the ones due to whole household migration, although the direction of the bias needs not to be the same. The challenges for the analysis of the effects of migration on those left behind are similar to those observed in different domains of economic analysis employing household-level data (see Edmonds *et al.*, 2005, Barsbai and Thiele, 2013, Hamoudi and Thomas, 2014, Foster and Milusheva, 2015). Our

[11] Specifically, women that are married, whose spouse does not belong to the same household, that were living in Mexico in January 1995 and that report to be receiving remittances from abroad.

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 does not depend just on the decision concerning who migrates, but it also hinges on the co-residence decisions of non-migrant family members. Third, it makes specific proposals on how to adjust data collection at origin to reduce its dependency with respect to the endogeneity of household composition.

The rest of the paper is structured as follows: Section 2 introduces the relevant definitions and the data used in the analysis of the endogeneity of co-residence choices, and Section 3 presents the descriptive statistics. Section 4 contains the results from the econometric analysis on the association between migration and variations in co-residence choices, while Section 5 explores whether the differential probability of attrition of migrant households is partly due to household dissolution. Section 6 provides evidence about the influence of the endogeneity of household composition on the collection of information on migration through retrospective questions, it discusses the ensuing analytical challenges, and it advances proposals for reducing the dependency of data collection on variations in co-residence choices. Finally, Section 7 draws the main conclusions.

2 Definitions and description of the ENOE

We characterize here the three main possible cases of variations in co-residence choices associated to the occurrence of an international migration episodes. Then, we introduce the main data source that is used to analyze the relationship between migration and co-residence choices, and we analyze how the data allow us detecting the occurrence of each one of these three cases.

2.1 Main types of variations in co-residence choices

Consider household A, which includes three members (a_1, a_2 and a_3), and households B and C, which include two members each (b_1 and b_2, and c_1 and c_2 respectively). Individual a_1 migrates from Mexico to the United States at time t_1, and we define household A as the household of origin of the migrant, while a_2 and a_3 are the individuals left behind by

the migrant a_1. After this migration episode, there are three possible cases: (i) no further variation in co-residence choices is observed, with a_2 and a_3 remaining in household A; (ii) at $t_2 > t_1$, b_1 and b_2 join the migrant household A, and are thus recorded as new members in this household; b_1 and b_2 start co-residing with the individuals left behind by the migrant; (iii) at $t_2 > t_1$, a_1 and a_2 join the non-migrant household C, where they are recorded as new members there; c_1 and c_2 start co-residing with the individuals left behind by the migrant, while household A dissolves.[12] Notice that case (ii) and (iii) are symmetrical, in the sense that the two members left behind by the migrant start co-residing with two other individuals at t_2; however, only case (ii), together with case (i), can be directly observed in the data, as discussed in Section 2.3 below.

2.2 The ENOE survey

We draw the data for our analysis from the quarterly *Encuesta Nacional de Ocupación y Empleo*, run by the INEGI in Mexico since 2005. 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. Households are defined as a group of individuals that live in the same dwelling space and that share food expenditures.[13] 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 interviews up to the last quarter of 2007.[14] The members of each household in the sample are assigned individual identifiers that do not vary across the five interviews, provided that

[12] Further cases are possible, as we might have that further variations in co-residence choices earlier on, i.e., $t_2 \leq t_1$, or that a_2, i.e., one of the two members left behind, could leave household A; these additional cases be considered in the empirical analysis, but we deliberately restrict the focus to the three cases described in the text as these are the empirically relevant ones, as shown in Sections 4 and 5 below.

[13] 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 (see INEGI, *Manual del entravistador de la ENOE*, p. 71).

[14] This entails that we also draw on the data from the 2007Q1-2007Q4 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.

they are continuously part of the household roster.[15] The ENOE allows tracking variations in the household composition occurring after the first interview; specifically, the enumerators compare the household roster with the one established in the previous interview, recording the reason of arrival and the place of origin of any individual who has joined the household, and the reason of the departure and the place of destination of any leaving member.[16] This also allows us identifying all the instances in which a household member migrates abroad. Seven out of the 12 rounds of the survey used for our analysis also include information on the receipt of remittances from abroad (see Table A.2 in the Appendix); notably, the question on the receipt of remittances from abroad is asked separately to all household members aged 15 and above, so that we can identify the recipient individual(s). Information on the amount of remittances is not provided by the ENOE. The choice of the period of analysis responds to two distinct justifications: the prevalence of international migration episodes is higher in 2005-2007 than in later periods, where the questions on the receipt of remittances is asked only once a year, in the second quarter. The higher incidence of migration to the United States and the greater availability of data on remittances contribute to increase the precision of our estimates on the relationship between migration and variations in co-residence choices, but all our results are robust to using data from later waves of the survey.[17]

2.3 Observing variations in co-residence choices in the ENOE

Let q =2005Q1,...,2006Q4, denote the quarter in which household A enters into the ENOE sample, and let s, with $s = 1, ..., 5$ denote the number of the interview, so that interview s takes place in quarter $q + (s - 1)$. As the occurrence of migration episodes is detected from variations in co-residence choices, the migration of individual a_1 can only be recorded if $q < t_1 < q + 4$, i.e., the migration episode occurs in the one-year period between the first and the fifth interview. We say that household A is a migrant household (short for a household reporting a migration episode) if there is at least one interview s, with $s = 2, ..., 5$, such that an individual that belonged to the household roster in interview $s - 1$ is no longer

[15]Similarly, the identity of the household head is determined during the first interview, and it is not updated in later interviews even if the household head no longer appears in the household roster.

[16]For the place of origin and of destination, the ENOE distinguishes between the same Mexican state, another Mexican state and abroad; 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).

[17]Results are available from the Authors upon request.

an household member, and he or she is reported to have migrated abroad. No migration episode can be reported by household A for individuals that have *not* been included in at least one quarter in its roster. Notice that non-migrant households might have experienced the migration of one of their members before the first interview in the ENOE, i.e., $t_1 < q$, which does not contain any retrospective question on migration.

The arrival of individual b_1 in household A can be observed if $q < t_2 < q + 4$, i.e., individual b_1 appears in the household roster in the interview s, with $s = 2, ..., 5$, while the same individual did not belong to household A at the time of the previous interview. Newborn babies, domestic servants, and individuals that were incorrectly omitted from the household roster in the previous quarter are not counted as new members of the household. The same individual can be at the same time a new member and (in a different interview) 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. The ENOE assigns invariant identifiers to all the individuals in that are continuously present in the roster of household A, while a returnee is *not* assigned the same identifier 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, and we do not consider as new members individuals that are also recorded as international migrants.

Similarly, we say that individual a_2 has left household A if there is an interview s, with $s = 2, ..., 5$, such that a_2 is no longer included in the roster of household A, to which she belonged to in the previous interview. Individuals that passed away, domestic servants and migrants to the United States are not counted as leaving members.[18]

Let us now consider the three main cases of variations in co-residence choices described in Section 2.1 above. The first two cases are straightforward, while the third one is thorny. Case (i) corresponds to the occurrence of (at least) one migration episode for household A, which does not record any new or leaving member. Case (ii) entails that household A

[18]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.

should record the arrival of b_1 and b_2 in the interview that follows t_2.[19] Case (*iii*) needs to be specified further. If the migration of a_1 and the dissolution of household A are separated by at least one interview, then we would observe the attrition of the migrant household A in the interview that follows t_2. Conversely, if the dissolution of household A occurs shortly after the migration of individual a_1, i.e., both t_1 and t_2 are before the following interview, then this would translate into the attrition of a non-migrant household, as household A drops out of the sample before reporting the migration of a_1.[20] Thus, case (*iii*) corresponds either to the attrition of a migrant or of a non-migrant household; this, in turn, entails that we cannot directly observe from the ENOE data the frequency with which case (*iii*) occurs, as attrition can clearly be due to additional factors that are unrelated to the dissolution of the household of origin of a migrant. If household C belonged to the ENOE sample, we would observe a_2 and a_3 joining this household in the interview following t_2, but we would have no direct information on the migration of a_1, as this individual did not belong to the roster of household C before migrating out of Mexico. Hence, we would be unable to identify the individuals, c_1 and c_2 in the example, that start co-residing with the individuals left behind by the migrant. An indirect signal of whether a_2 and a_3 came from a dissolved household of origin of a migrant can be obtained from the individual-level information on the receipt of remittances from abroad contained in the ENOE, as discussed in Section 5 below.

3 Descriptive statistics

The sample used in our analysis includes 170,306 households whose first interview took place between 2005Q1 and 2006Q4, out of which 141,168 were successfully interviewed for five consecutive quarters. The rate of attrition stands at 17.1 percent over the entire period (see Table 1),[21] and a large fraction of the instances of attrition, namely 10,718 out of 29,138,

[19] If the arrival of the new member occurs after the last interview, i.e., $t_2 > q + 4$, then we would consider the migrant household A has having recorded no additional variations in co-residence choices.

[20] Notice that household dissolution intervening shortly after migration has implications for observing the occurrence of an international migration episode that are identical to those due to a simultaneous migration of the entire household A.

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

Table 1: Descriptive statistics

	Entire sample			Rural areas			Urban areas		
Households	All	Non-migr.	Migrant	All	Non-migr.	Migrant	All	Non-migr.	Migrant
Attrition rate	0.171	0.173	0.085	0.127	0.130	0.061	0.188	0.189	0.109
Household size	4.059	4.030	5.110	4.255	4.204	5.281	3.978	3.959	4.934
Years of education	10.757	10.768	10.366	8.542	8.513	9.140	11.677	11.678	11.619
Nuclear household	0.747	0.750	0.658	0.757	0.760	0.693	0.743	0.746	0.623
Three-generation	0.161	0.160	0.228	0.165	0.162	0.216	0.160	0.159	0.241
Remittances (5^{th} interview)	0.046	0.037	0.348	0.088	0.073	0.402	0.029	0.023	0.298
Remittances (1^{st} interview)	0.052	0.049	0.151	0.091	0.087	0.187	0.035	0.033	0.114
Observations	170,306	166,063	4,243	47,457	45,368	2,089	122,849	120,695	2,154
Observations (non-attrited)	141,168	137,287	3,881	41,422	39,461	1,961	99,746	97,326	1,920

Notes: Household characteristics are measured at the time of the first interview, unless otherwise stated; years of education is the highest among household members aged 15 and above; nuclear households are defined as those including, at most, the spouse and the children of the household head; three-generation households are non-nuclear households that include members belonging to three different generations (e.g., head, children and grand-children); rural areas are defined as the municipalities with less than 15,000 inhabitants; information on remittances is available, for the entire sample, for 105,491 and 52,438 at the 1^{st} and at the 5^{th} interview respectively.

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

occur between the first and the second interview, as in Fernández-Huertas Moraga (2013).[22] As the probability that a household reports a migration episode increases with the number of interviews and no migration episode can be reported before the second interview, the share of migrant households that do not complete five interviews is mechanically lower than the corresponding one for non-migrant households: 8.5 and 17.3 percent respectively.

3.1 Migration episodes

The international migration of 4,880 individuals are reported by 3,881 distinct households, representing 2.75 percent of the sample of non-attrited households. The number of migrant households is almost identical in urban (1,920) and in rural areas (1,961), although the share of migrant households is substantially higher in rural areas: 4.40 compared to 1.75 percent. International migrants are predominantly male (76.6 percent), although the gender composition of the migrants varies between urban and rural areas. 90.1 percent of the migrants were included in the roster of the household reporting their migration in the first

[22]We consider as attrited 6,120 households that drop out of the sample at least once and are then interviewed again in a later round.

Table 2: Initial, new, leaving and migrant members (all households)

	Type of member						
	Initial	New	Leaving	Migrant		Difference	
	(1)	(2)	(3)	(4)	(2)-(1)	(3)-(1)	(4)-(1)
Age	38.228	30.067	28.584	30.447	-8.161***	-9.644***	-7.782***
Female	0.531	0.507	0.499	0.222	-0.024***	-0.032***	-0.310***
Years of education	8.573	8.851	9.398	8.316	0.278***	0.825***	-0.257***
Relationship with the household head							
Head	0.246	0.017	0.074	0.306	-0.229***	-0.176***	0.060***
Spouse	0.176	0.072	0.038	0.065	-0.104***	-0.141***	-0.112***
Son or daughter	0.452	0.305	0.435	0.459	-0.147***	-0.017***	0.007
Parent	0.009	0.037	0.015	0.006	0.028***	0.006***	-0.003*
Sibling	0.010	0.036	0.027	0.018	0.026***	0.017***	0.008***
Grandchild	0.065	0.230	0.203	0.068	0.165***	0.141***	0.003
Nephew or niece	0.010	0.070	0.055	0.016	0.061***	0.046***	0.006***
Cousin	0.001	0.012	0.007	0.002	0.011***	0.006***	0.001**
Spouse's parent	0.004	0.016	0.008	0.002	0.012***	0.004***	-0.001
Son's parent in law	0.000	0.001	0.000	0.000	0.001***	0.000***	0.000**
Son or daughter in law	0.018	0.133	0.091	0.042	0.115***	0.075***	0.024***
Brother or sister in law	0.003	0.035	0.022	0.008	0.031***	0.019***	0.004***
Other relative	0.000	0.003	0.002	0.001	0.002***	0.002***	0.001*
Non relative	0.003	0.033	0.023	0.005	0.031***	0.020***	0.003***
Domestic worker	0.002	0.000	0.000	0.001	-0.002***	-0.002***	-0.000
Observations	573,032	27,038	44,774	4,880	600,070	617,806	577,912

Notes: age, years of education and sex are defined for members aged 15+; household headship is defined at the time of the first interview; the variables referring to new members, leaving members and migrants are measured at the time of the variation in their residence status; the four groups reported in this table are not mutually exclusive, as one individual can record multiple variations in her residence status over the period of analysis; *,** and *** denote significance at the 10, 5 and 1 percent confidence level.

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

interview, while 9.9 percent of them joined the household shortly before leaving Mexico. Around three out of four international migrants are either the household head (30.6 percent) or his or her sons and daughters (45.9 percent), as reported in Table 2.

3.2 Receipt of remittances

34.8 percent of migrant households report receiving remittances over a three-month recall period before the fifth interview. Remittance recipients represent 5.2 percent of the households in the first interview, and this share is substantially higher for migrant (15.1 percent) than for non-migrant households (4.9 percent), as reported in Table 1. The larger share of migrant recipient households before any migration episode is observed in the ENOE suggests that either remittances came from individuals who migrated out of other households in the same family network, or that they were sent by (former) members of the same household that migrated before the 12-month period in which migration episodes are recorded.[23]

3.3 Demographic composition and living arrangements

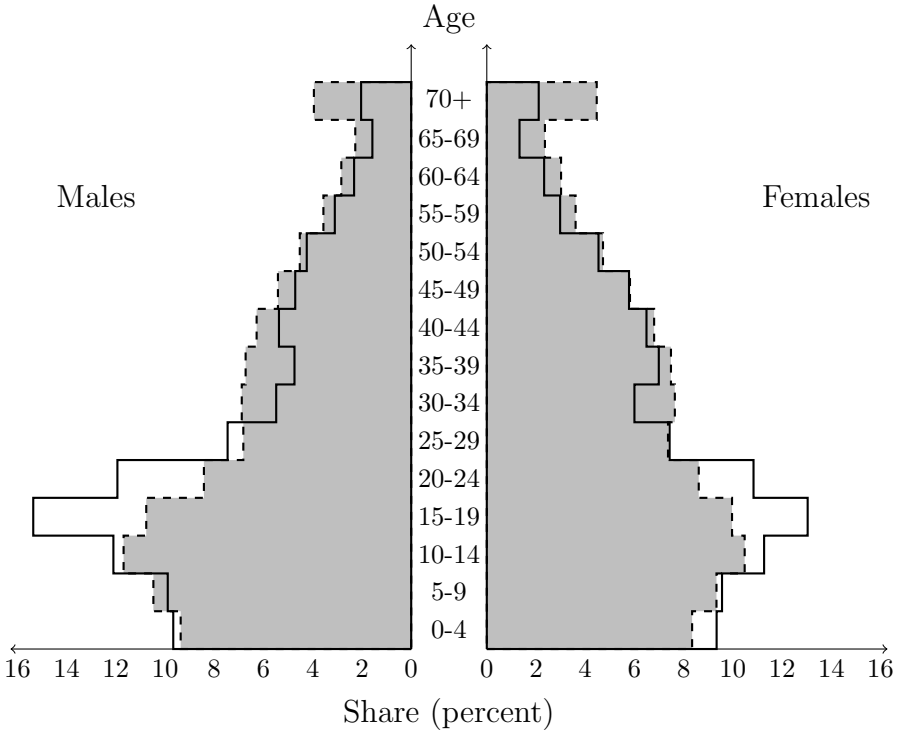
If we compare the characteristics of migrant and non-migrant households at the first interview, we can notice that living arrangements differ between the two groups of households already before the occurrence of a migration episode. Migrant households are larger than non-migrant households (5.11 and 4.03 members respectively), and tend to have a more complex structure, as 22.8 percent of them have at least three generations that co-reside,[24] compared to 16.0 percent for non-migrant households.

Figure 1 reports the age pyramid separately for the two types of households, and it reveals that both males and females in the age cohorts 15-19 and 20-24 are largely over-represented in migrant households, while the opposite pattern is observed between 30 and 44 years of age. As the likelihood of events that can lead to a variation in co-residence choices, such as

[23]This latter conjecture is strengthened by the observation that 20.2 percent of migrant households received at least one returnee from the United States over the period of observation (returnees represent 183 out of the 1,143 new members joining migrant households), while the corresponding share for non-migrant households stands at 0.9 percent only.

[24]A three-generation household is a household including members belonging to at least two different generations between the ascendants (parents, grand-parents) or descendants (children, grand-children) of the household head and of his or her spouse; by definition, all three-generation households are non-nuclear.

Figure 1: Age pyramid in migrant and non-migrant households



Notes: the solid (dashed) line represents the age structure of migrant (non-migrant) households observed in the first interview.
Source: Authors' elaboration on ENOE 2005Q1-2006Q4.

marriage, divorce, internal or return migration from the United States, varies with age, the initial differences in the household demographic structure have to be controlled for in the econometric analysis.

3.4 Variations in co-residence choices

Let n_j^q (l_j^q) represent a dummy variable taking the value of 1 if household j, whose first interview took place in quarter q, received at least one new member (lost at least one of its members) over the period of observation and 0 otherwise, and let $v_j^q \equiv \max\{n_j^q, l_j^q\}$ represent a dummy that signals whether household j recorded any variation in its composition. As reported in Table 3, 22.7 percent of the households that have been interviewed for five quarters in the sample experience a variation in their composition over the 12-month period of observation ($v_j^q = 1$), 11.1 percent saw at least one new member joining ($n_j^q = 1$), and

Table 3: Migration and variations in co-residence choices

	Entire sample			Rural areas			Urban areas		
Households	All	Non-migr.	Migrant	All	Non-migr.	Migrant	All	Non-migr.	Migrant
$n_j^q = 1$	0.111	0.110	0.163	0.117	0.116	0.137	0.109	0.107	0.191
New members $\|n_j^q = 1$	1.723	1.720	1.803	1.706	1.706	1.705	1.731	1.726	1.874
One new member $\|n_j^q = 1$	0.634	0.636	0.591	0.642	0.642	0.642	0.630	0.633	0.555
$n_j^q = 1$, no returnees	0.103	0.102	0.130	0.103	0.103	0.099	0.103	0.102	0.161
$l_j^q = 1$	0.171	0.170	0.211	0.177	0.176	0.201	0.169	0.168	0.220
Leaving members $\|l_j^q = 1$	1.851	1.852	1.842	1.861	1.865	1.803	1.847	1.846	1.879
One leaving member $\|l_j^q = 1$	0.595	0.596	0.560	0.587	0.587	0.590	0.598	0.600	0.532
$v_j^q = 1$	0.227	0.225	0.302	0.239	0.237	0.280	0.222	0.220	0.325
$v_j^q = 1$, no returnees	0.221	0.219	0.277	0.228	0.226	0.253	0.218	0.216	0.301
Observations	141,168	137,287	3,881	41,422	39,461	1,961	99,746	97,326	1,920

Notes: n_j^q, l_j^q and v_j^q are dummies that take the value of one if household j entering the sample in quarter q receives at least one new member, loses one of its members or either of the two; the sample includes households that have been interviewed for five consecutive quarters.

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

17.1 percent lost at least one of their member ($l_j^q = 1$). Table 3 also reveals that 30.2 percent of migrant households experience a variation in their composition, a share that is significantly larger than the 22.7 percent that is observed for non-migrant households, and that the differences between migrant and non-migrant households are substantially more pronounced in urban than in rural areas.

3.5 Who joins and who leaves?

Variations in household composition are produced by 68,291 individuals who either join or leave a household, or both: 41,253 of them are observed leaving the household, 23,478 join the household, and 3,560 both join and leave in different quarters (see Table 2). 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 all individuals move among existing households or the frequency of household formation and of household dissolution coincide.

Figure A.1 in the Appendix compares the age structure of initial household members with those of the individuals that either join or leave the household. The two latter age structures are broadly similar, with the share of new and leaving members aged 15 to 29

being larger than the corresponding share for initial members for both males and females. The same occurs for children aged 0 to 4, which move in or out the households in our sample together with their parent(s) (see also Edmonds *et al.*, 2005). The excess of leaving over new members aged 15 to 29 in Figure A.1 is consistent with the fact that most individuals who get married and form an independent household belong to these age groups.

Table 2 provides information on some key individual characteristics and on their relationship to the household head for the new, leaving and migrant members, comparing them with those of initial household members, i.e., individuals included in the household roster at the time of the first interview. Men and women are equally represented among the individuals that change their residence status over the period of analysis, they are significantly younger than initial household members, and have a similar level of education. Table 2 also reveals that the household head, his or her spouse, sons and daughters account for 87.4 percent of the individuals in the initial roster (as most households have a nuclear structure, as evidenced in Table 1 above), but just 39.4 percent of new members, while grandchildren (23.0 percent) and sons or daughters in law (13.3 percent) are greatly over-represented among new members.[25]

4 Empirical analysis

Table 3 suggests that the occurrence of migration episodes is systematically associated with further variations in co-residence choices. Migration is, *per se*, a decision concerning co-residence, so that our objective here is not to establish a causal relationship between these two closely intertwined phenomena. Nevertheless, we need to verify whether the stylized facts emerging from Table 3 are robust once we control for pre-migration household characteristics that could be correlated with both,[26] and with possible spatial differences within Mexico in the incidence of migration and in the frequency of variations in household composition. Specifically, we are going to control for a vector $\mathbf{x}_{j1}^{q}$ of variables related to household

[25]The ENOE allows us, albeit imperfectly, identifying the relationship of the new household members with the migrant(s) through their bilateral relationship with the household head; most new members belong either to the same (e.g., siblings, siblings in law) or to a later (e.g., children, nephews) generation with respect to the migrant.

[26]A non-significant association when controlling for pre-migration household characteristics would considerably mitigate the analytical challenges posed by the endogeneity of co-residence choices.

j and measured during the first interview, i.e., $s = 1$, and include dummies for each Mexican municipality in the ENOE.[27] The vector $\mathbf{x}_{j1}^q$ includes the number of initial household members in each of the 30 gender-specific five-year age cohorts reported in Figure 1, as well as the highest number of years of education among adult household members.[28] We thus introduce fine-grained controls for the initial demographic structure of the household, as Figure A.1 strongly suggests that the likelihood of a variation in one's own co-residence status greatly varies with age. A legitimate concern could be expressed about the endogeneity of $\mathbf{x}_{j1}^q$ due to reverse causality, as some migration-induced variations in household composition might actually occur already before an international migration episode is observed for household j. Reassuringly, variations in household composition actually do not occur before migration, as shown below in Sections 4.1 and 4.3.

4.1 Migration and the arrival of new household members

We initially collapse the longitudinal dimension of the data, and we estimate the following regression through a linear probability model on the sample of 141,168 non-attrited households:

$$n_j^q = \alpha m_j^q + \boldsymbol{\beta}' \mathbf{x}_{j1}^q + d_{m(j)} + d_q + \epsilon_j, \tag{1}$$

where n_j^q and m_j^q are dummies that signal whether household j received at least one new member and had at least one international migrant over the 12-month period of observation, and $d_{m(j)}$ and d_q are dummies for the Mexican municipality of residence of household j, and for the quarter q =2005Q1,...,2006Q4 in which household j entered the ENOE sample. The first three data columns in Table 4 reveal that the association between the occurrence of a migration episode and the arrival of new member(s) is robust to the inclusion of household-level controls and municipal fixed effects: when both are included, we obtain a highly statistically significant value for $\widehat{\alpha}$, which stands at 0.038. Thus, having at least one household member migrating out of Mexico is associated with a 34.5 percent increase in the probability of receiving a new household member with respect to the baseline probability for non-migrant

[27] 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.

[28] All reported results are robust to the inclusion in the vector $\mathbf{x}_{j1}^q$ of a dummy that signals whether household j had a nuclear structure in the first interview.

Table 4: Migrant households and new members

	Dependent variable: n_j^q					
	(1)	(2)	(3)	(4)	(5)	(6)
m_j^q	0.054***	0.037***	0.038***	0.038***	0.021***	0.023***
	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)
Female migrant(s)				0.066***	0.067***	0.063***
				(0.015)	(0.015)	(0.015)
Adjusted-R^2	0.00	0.02	0.03	0.00	0.02	0.03
Observations	141,168	141,168	141,168	141,168	141,168	141,168
Controls	No	Yes	Yes	No	Yes	Yes
Municipality FE	No	No	Yes	No	No	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
$n_j^q \vert m_j^q = 0$	0.110	0.110	0.110	0.110	0.110	0.110
F-test controls		59.558	60.433		59.505	60.283

Notes: ***, ** and * denote significance at the 1, 5 and 10 percent level respectively; standard errors are robust to heteroskedasticity; n_j^q is a dummy variable equal to 1 if household j reports at least one new member over the period of observation, and 0 otherwise; m_j^q is a dummy variable equal to 1 if household j reports at least one international migrant over the period of observation, and 0 otherwise; female is a dummy variable equal to 1 if at least one of the household members who migrate is a woman; 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.

households, which stands at 11.0 percentage points.[29]

What is the relative timing of the arrival of these new household members of the occurrence of international migration episodes? Table A.2 in the Appendix exploits the longitudinal dimension of the data to answer this question: migrant households are more likely than non-migrant households to receive a new member in the same quarter in which the migration episode is recorded and in the following two quarters. Variations in household composition due to the arrival of new members do *not* appear to occur before migration, and this is reassuring with respect to the exogeneity of the vector $\mathbf{x}_{j1}^q$ in Eq. (1).

[29]Table A.1 in the Appendix shows that this result is robust once we exclude from the sample all households where the new member is a returnee from the United States: we obtain $\widehat{\alpha} = 0.22$, i.e., a 21.4 percent increase with respect to the (lower) baseline probability of 10.3 percentage points.

This statistically significant association between n_j^q and m_j^q in Table 4 is heterogeneous along two notable dimensions: the sex of the migrant(s), and the area of residence of the household. The remaining three data columns in Table 4 allow the association between migration and the arrival of new members to be a function of the sex of the migrant(s): specifically, we introduce a dummy that takes the value of 1 if there is at least a woman among the migrants of household j,[30] and 0 otherwise. The estimates suggest that the association between n_j^q and m_j^q is greatly magnified when a woman migrates: the increase in the probability of receiving a new member stands at 78.2 percent of the baseline probability, i.e., (0.023+0.063)/0.110, almost four times larger than the estimated effect (20.9 percent) for households with just male migrants. This differential effect could be consistent with a gender-specific intra-household allocation of tasks (Fafchamps and Quisumbing, 2008), with Mexican women that are disproportionately in charge of the provision of household chores, possibly over and above their contribution to household income. Once they migrate, household chores such as those related to child and elderly care could be more easily supplied by new co-resident family members rather than through market transactions financed by migrants' remittances. However, the data are inconsistent with a corollary of this argument based on a gender-specific allocation of tasks, namely that female migration should be associated with a higher probability of receiving an adult woman among the new members. An alternative explanation relies on the fact that most Mexican women migrate to join a relative (most of the times, their husband) in the United States, while half of Mexican men migrate independently (see Cerrutti and Massey, 2001). The differential effect by gender reported in Table 4 is entirely due to married migrants, with no difference by gender emerging when the migrant is a single.[31] The migration of a husband typically entails that the wife is left behind, while the reverse is not true.[32] Furthermore, a married migrant woman is (much) more likely to be living in a household that reports receiving remittances from abroad already in the first interview (hence, before the woman left Mexico) compared to a married migrant man: 28.2 and 11.6 percent respectively. If the arrival of new member reflects an implicit exchange between the new member and the migrant, e.g., provision of child or elderly care in exchange

[30] 24.5 percent of the 3,881 migrant households in our sample reported at least one woman among their migrant members.

[31] Results are available from the Authors upon request.

[32] The ENOE data reveal that 94.7 percent of the married migrant men were living with their wives before migrating, while the corresponding share among married migrant women is just 32.9 percent.

for remittances, then such an exchange appears to be considerably less risky when a woman migrates. The migration of a woman who joins her husband in the United States could also free up more housing space, e.g., the initial migration of a man does not free up a bedroom, which is still occupied by his wife left behind.

Tables A.3 and A.4 in the Appendix present the estimates of the baseline and extended specification of Eq. (1) separately for urban and rural households. In urban areas, the estimated coefficient for m_j^q stands at 0.072 once we include household controls and municipal dummies, i.e., a highly statistically significant 67.3 percent increase over the baseline probability of receiving a new member over the 12-month observation period. Conversely, the differences in rural areas, that were smaller to begin with (see Table 3), are no longer statistically significant once we control simultaneously for initial household characteristics and municipal dummies. What could explain this sharp difference in the results between urban and rural areas? A possible conjecture is that mutual help or monitoring could be easier among non co-resident family members in a small rural village (Angelucci *et al.*, 2017; de Laat, 2014) than in large urban areas where different households within the same family network could be separated by large commuting distances. Similarly, the value of the housing space left vacant by the migrant is likely to be much higher in urban rather than in rural areas.

The fact that migrant households are significantly more likely to receive new member(s) entails that other households within their family network also experienced a variation in their household composition that has been (indirectly) induced by migration. This happens as new members in migrant households are relatives of the household head (see Table 2), and they left a household that possibly did not record any migration episode over the period of observation.

4.2 Migration and leaving members

We estimate the following regression through a linear probability model on the sample of non-attrited households:

$$l_j^q = \alpha m_j^q + \boldsymbol{\beta}' \mathbf{x}_{j1}^q + d_{m(j)} + d_q + \epsilon_j, \tag{2}$$

When we consider a simple bivariate correlation between l_j^q and m_j^q, 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 4, the inclusion of the household controls completely changes the picture that emerges from Table 5. Notably, the probability of losing one member (intuitively) increases with the initial size of the household, and migrant households 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 (notably the differences in the age structure of initial household members, see Figure 1), migrant households appear to have a significantly lower probability of losing one (more) of their members,[33] a result that could reflect a relationship of substitutability between domestic and international migration episodes. According to the evidence provided in Section 4.1, a relevant *un*observed determinant of l_j^q that ends up in the error term ϵ_j of Eq. (2) could be the occurrence of migration episodes elsewhere within the family network of household j, which could induce some individuals to leave household j and join the migrant household. If just one migration episode occurs out of most family networks over the period of observation in the ENOE, then this possible omitted variable bias could contribute to explain the results reported in Table 5, as we would have a negative correlation between m_j^q and ϵ_j in Eq. (2).

Furthermore, notice that Table 5 is informative about the correlates of losing one member conditional upon *not* losing all its members: 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 sample upon which Table 5 is based.

4.3 Attrition

Are households that report a migration episode more likely to drop out of the sample in a later interview? We can answer to this question estimating the following regression:

$$a_{js}^q = \gamma m_{j[2;s]}^q + \boldsymbol{\beta}' \mathbf{x}_{j1}^q + d_{m(j)} + d_q \times d_s + \epsilon_{js}, \text{ with } s = 2, 3, 4, \tag{3}$$

where a_{js}^q is a dummy signaling whether household j drops out of the sample between interview s and $s+1$, $m_{j[2;s]}^q$ is a dummy that takes the value of 1 if household j reported

[33] Similar results are obtained when estimating Eq. (2) separately for urban and rural areas; results are available from the Authors upon request.

Table 5: Migrant households and leaving members

	Dependent variable: l_j^q					
	(1)	(2)	(3)	(4)	(5)	(6)
m_j^q	0.040***	-0.035***	-0.033***	0.027***	-0.040***	-0.036***
	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)
Female migrant(s)				0.053***	0.020	0.014
				(0.016)	(0.015)	(0.015)
Adjusted-R^2	0.00	0.11	0.12	0.00	0.11	0.12
Observations	141,168	141,168	141,168	141,168	141,168	141,168
Controls	No	Yes	Yes	No	Yes	Yes
Municipality FE	No	No	Yes	No	No	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
$l_j^q \vert m_j^q = 0$	0.170	0.170	0.170	0.170	0.170	0.170
F-test controls		365.093	376.404		364.567	375.892

Notes: ***, ** and * denote significance at the 1, 5 and 10 percent level respectively; standard errors are robust to heteroskedasticity; l_j^q is a dummy variable equal to 1 if household j reports at least leaving member over the period of observation, and 0 otherwise; m_j^q is a dummy variable equal to 1 if household j reports at least one international migrant over the period of observation, and 0 otherwise; female is a dummy variable equal to 1 if at least one of the household members who migrate is a woman; 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.

one international migration episode in any interview up to s, and d_q and d_s are dummies for the quarter q in which household j entered the sample and for the interview s respectively. Migration episodes can be observed only since the second interview, and this is why we estimate Eq. (3) only between the second and the fourth interview.

Table 6 reveals that the occurrence of a migration episode significantly increases the probability of attrition, with an estimated effect that stands at 26.8 percent of the baseline probability of attrition for non-migrant households. This result only emerges once we control for initial household characteristics, given that attrition is more likely for households with fewer members, and migrant households are significantly larger (see Table 1). Similarly to what happens for the arrival of a new member, the size of the estimated effect depends on the gender of the migrant, and on the area of residence of the household. The last data column in Table 6 reveals that households with a female migrant are 73.2 percent more likely to drop out of the sample. Tables A.5 and A.6 in the Appendix reveal that the estimated effects is stronger in urban areas, and that rural households with a female migrant also experience a significantly higher probability of attrition. With respect to the relative timing of migration and attrition, Table A.7 in the Appendix reveals that a migration episode reported in interview s significantly increases the probability that $a^q_{js} = 1$, and marginally also the probability that $a^q_{js+1} = 1$.

5 Is attrition of migrant households partly due to household dissolution?

What could explain the observed differential in the probability of attrition between migrant and non-migrant households in Table 6? It is important to notice that this cannot be due to a simultaneous whole household migration, as otherwise no migration episode would have been reported in the ENOE: whole household migration would have rather given rise to the attrition of a (for us) non-migrant household, thus reducing rather than widening the differential in the probability of attrition between migrant and non-migrant households.[34]

[34]Sequential whole household migration, with the members left behind joining the migrant in the United States a few months after reporting the migration episode in the ENOE, could in principle explain the results in Table 6; however, the empirical relevance of this argument is limited, as the data from the ACS reveal that the average distance between the migration episodes of two Mexican spouses that reside together in

Table 6: Migration and attrition

	Dependent variable: a^q_{js}					
	(1)	(2)	(3)	(4)	(5)	(6)
$m^q_{j[2;s]}$	-0.002	0.006***	0.011***	-0.007***	-0.001	0.004*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Female migrant(s)				0.022***	0.030***	0.026***
				(0.006)	(0.006)	(0.006)
Adjusted-R^2	0.00	0.02	0.02	0.00	0.02	0.02
Observations	457,587	457,587	457,587	457,587	457,587	457,587
Controls	No	Yes	Yes	No	Yes	Yes
Municipality FE	No	No	Yes	No	No	Yes
$q \times s$ FE	Yes	Yes	Yes	Yes	Yes	Yes
$a^q_{js} \vert m^q_j = 0$	0.041	0.041	0.041	0.041	0.041	0.041
F-test controls		168.430	160.467		168.712	160.744

Notes: ***, ** and * denote significance at the 1, 5 and 10 percent level respectively; a^q_{js} is a dummy variable signaling whether household j drops out of the sample between interview s and $s+1$; $m^q_{j[2;s]} \equiv \max\{m^q_{j2}, ..., m^q_{js}\}$; female is a dummy variable equal to 1 if at least one of the household members who migrate is a woman; 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; standard errors are clustered at the household level.

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

If the higher probability of attrition for migrant household is at least partly due to household dissolution, then other household(s) within the same family network should receive the individuals coming from the dissolved migrant households. The ENOE does not provide information on the reason why new members joined the household that are sufficiently fine-grained to directly verify this, but it provides an indirect key signal: the information on the receipt of remittances from abroad.

Our reasoning goes as follows: consider two households A and C, whose members are related by family ties; if the household A dissolves after the occurrence of an international migration episode and all its members join household C, then the migrant who left from household A is likely to send remittances to household C. Thus, we expect that the probability that a non-migrant household C reports having received remittances over a three-month recall period should be higher if household C has recently received new member(s) and it resides in a high-migration Mexican municipality, as in this case new members are more likely to come from a dissolved household of origin of a migrant.[35]

5.1 The arrival of new members and the receipt of remittances

The approach to test whether the differential probability of attrition of migrant household is partly due to household dissolution that we have just outlined is extremely demanding, as it hinges on two key assumptions that are worth discussing: (i) different households within the same family network are spatially concentrated in Mexico, and (ii) Mexican migrants start sending remittances shortly after they moved to the United States. Assumption (i) justifies the interaction between the arrival of a new member with a dummy for a high-migration municipality.[36] Around 4 out of 5 the individuals who are observed changing their residence status in the ENOE remain within the same Mexican state, and this is reassuring with respect to the empirical plausibility of the (untestable) assumption (i). With respect

the United States and who migrated separately exceeds eight years (see also Cerrutti and Massey, 2001 and McKenzie and Rapoport, 2010 on this).

[35] An alternative explanation could be that household C receives one or more members who left migrant household A, which has not dissolved; the data do not appear to be consistent with this explanation, as discussed below.

[36] If the family network is geographically concentrated, then the dissolved household of origin of the migrant and the household that its members join are likely to reside in municipalities with a similar migration rate.

to assumption (*ii*), Section 4.3 provides evidence that the attrition of migrant households occurs in the two interviews that follow the migration episode, so that the members of the dissolved household of origin of the migrant probably join their new household no later than nine months since migration. This entails that only remittances sent by a migrant no later than one and a half year since she left could be recorded during the observation period of the ENOE.[37]

We rely on the following specification, which is estimated on the sub-sample of non-migrant households only:

$$r^q_{ks} = \alpha_1 n^q_{k[2;s]} + \alpha_2 n^q_{k[2;s]} * \text{high}_{m(k)} + \boldsymbol{\beta}' \mathbf{x}^q_{k1} + d_{m(k)} + d_q \times d_s + \epsilon_{ks}, \text{ with } s = 2, ..., 5, \quad (4)$$

where r^q_{ks} is a dummy variable signaling whether household k entering the ENOE sample in quarter q reported receiving remittances from abroad over a three-month recall period before interview s, $n^q_{k[2;s]}$ is a dummy that takes the value of 1 if household k received a new member in any interview up to s, $\text{high}_{m(k)}$ is a dummy signaling whether household k resides in a high-migration municipality,[38] and $d_{m(k)}$ and $d_{q\times s}$ are municipality and quarter-interview fixed effects respectively. The inclusion of municipality dummies $d_{m(k)}$ absorbs the direct effect of living in a high-migration municipality on the likelihood of receiving remittances from abroad for non-migrant households,[39] while the interactive fixed effect $d_q \times d_s$ allows for a flexible dependency of the receipt of remittances on unobserved common time-varying factors.

Table 7 reports the estimates of Eq. (4) for a sub-sample of non-migrant households, excluding those where new members are returnees from the United States.[40] The estimated

[37] Although migrants might experience an initial spell of unemployment at destination, the extensive network of Mexican migrants in the the United States should facilitate the integration of newly arrived migrants on the labor market at destination (Munshi, 2003), and thus reducing the time lag between migration and the transfer of remittances back to Mexico.

[38] We rely on the 2000 Mexican Population Census to identify the municipalities with an emigration rate between 1995 and 2000 that is above the median value of the municipalities covered by the ENOE in the estimation sample.

[39] Non-migrant households could be receiving remittances from migrants from their family network with whom they were not co-residing because of migrants' altruism, or in exchange for the contribution they provided to cover migration costs.

[40] This restriction to the sample, which does *not* affect the reported results, is introduced as the estimation of Eq. (4) is instrumental to understanding whether new members come from dissolved households that were living in Mexico.

Table 7: Receipt of remittances by non-migrant households

	Dependent variable: r^q_{ks}					
	(1)	(2)	(3)	(4)	(5)	(6)
$n^q_{k[2;s]}$	0.0157**	0.0080***	0.0117***	0.0041**	0.0124***	0.0038*
	(0.0021)	(0.0020)	(0.0021)	(0.0020)	(0.0020)	(0.0020)
$n^q_{k[2;s]} * \text{high}_{m(k)}$		0.0178***		0.0177***		0.0182***
		(0.0193)		(0.0192)		(0.0474)
Adjusted-R^2	0.00	0.01	0.03	0.04	0.09	0.09
Observations	286,538	286,538	286,538	286,538	286,538	286,538
Controls	No	No	Yes	Yes	Yes	Yes
Municipality FE	No	No	No	No	Yes	Yes
$q \times s$ FE	Yes	Yes	Yes	Yes	Yes	Yes
$r^q_{ks} \vert n^q_{k[2;s]} = 0$	0.037	0.037	0.037	0.037	0.037	0.037
$r^q_{ks} \vert n^q_{k[2;s]} = 0, \text{high}_{m(k)} = 1$	0.058	0.058	0.058	0.058	0.058	0.058
F-test controls			83.595	81.931	66.986	66.970

Notes: ***, ** and * denote significance at the 1, 5 and 10 percent level respectively; $r^q_{ks} = 1$ if household k entering the ENOE sample in quarter q reported receiving remittances from abroad over a three-month recall period before interview s, $n^q_{k[2-s]} = 1$ if household k received a new member in any interview up to s, and $\text{high}_{m(k)}$ is a dummy signaling whether household k resides in a high-migration municipality; sample does not include households with new member(s) returning from the United States; standard errors are clustered at the household level.

Source: Authors' elaboration on ENOE, 2005Q1-2007Q2 and 2000 Mexican Population Census.

coefficient α_2 for the interaction term stands at 0.0182 when we include both household controls and municipality fixed-effects. Non-migrant households receiving a new member and residing in a high-migration Mexican municipality are 49.2 percent more likely to start receiving remittances than non-migrant households without new members.[41] Tables A.8 and A.9 in the Appendix report the estimates separately for urban and rural households: the estimated coefficient of interest is significant for both sub-samples, but the effect is larger in urban areas, where non-migrant households with a new member and residing in a high-migration Mexican municipality are 62.5 percent more likely to report the receipt of remittances, compared to 38.1 percent in rural areas. This difference in the size of the estimated effect is consistent with the different strength of the association between migration and attrition in urban and rural areas (see Tables A.5 and A.6 in the Appendix).

5.2 Threats to our interpretation

The estimates in Table 7 are consistent with our conjecture that the new members could come from dissolved households of origin of Mexican migrants, but such an interpretation is exposed to various threats, that would produce an identical pattern in the data. Specifically, households with no international migration episode over the 12-month period of observation in the ENOE might have deliberately mis-reported the destination of the members that left the household (Hamilton and Savinar, 2015), or they might have experienced a migration episode before the beginning of the observation period.[42] In both cases, remittances would be sent from a former household member, and this (unobserved or misreported) migration episode could also induce the arrival of new household members, as shown in Section 4.1. As previous or not reported migration episodes are likely to be more frequent in high-migration municipalities, this would produce a positive point estimate for α_2. Furthermore, a negative

[41] Results, that are available from the Authors upon request, are robust to the exclusion from the sample of non-migrant households that reported to receive remittances from abroad already in the first interview.

[42] Sections 4.1 and 4.3 above provide evidence that variations in co-residence choices in migrant households occur at the time or shortly after the occurrence of a migration episode. Nevertheless, the limited length of the observation period in the ENOE does not, *per se*, allow to rule out the hypothesis that the arrival of a new member could also occur later on, namely when the household of origin of the migrant starts benefiting from the positive income effect due to the receipt of remittances; Gutierrez et al. (2017) do not find that the positive income effect induced by the receipt of an old-age pension modifies the composition of Mexican households.

Table 8: Placebo test on the receipt of remittances by non-migrant households

	Dependent variable: r'^{q}_{ks}					
	(1)	(2)	(3)	(4)	(5)	(6)
$n^q_{k[2;s]}$	0.0023	0.0011	-0.0016	-0.0028	-0.0009	-0.0031*
	(0.0019)	(0.0017)	(0.0018)	(0.0017)	(0.0018)	(0.0017)
$n^q_{k[2;s]} * \text{high}_{m(k)}$		0.0042		0.0041		0.0046
		(0.0037)		(0.0037)		(0.0036)
Adjusted-R^2	0.00	0.01	0.03	0.04	0.09	0.09
Observations	286,538	286,538	286,538	286,538	286,538	286,538
Controls	No	No	Yes	Yes	Yes	Yes
Municipality FE	No	No	No	No	Yes	Yes
$q \times s$ FE	Yes	Yes	Yes	Yes	Yes	Yes
$r'^{q}_{ks} \mid n^q_{k[2;s]} = 0$	0.037	0.037	0.037	0.037	0.037	0.037
$r'^{q}_{ks} \mid n^q_{k[2;s]} = 0, \text{high}_{m(k)} = 1$	0.058	0.058	0.058	0.058	0.058	0.058
F-test controls			84.488	82.940	68.126	68.118

Notes: ***, ** and * denote significance at the 1, 5 and 10 percent level respectively; $r'^{q}_{ks} = 1$ if initial household members in household k reported receiving remittances from abroad over a three-month recall period before interview s, $n^q_{k[2-s]} = 1$ if household k received a new member in any interview up to s, and $\text{high}_{m(k)}$ is a dummy signaling whether household k resides in a high-migration municipality; sample does not include households with new member(s) returning from the United States; standard errors are clustered at the household level.

Source: Authors' elaboration on ENOE, 2005Q1-2007Q2 and 2000 Mexican Population Census.

shock hitting either the household joined by the new members or their household of origin could also be associated with the receipt of remittances for households connected to Mexican migrants in the United States.[43] As the likelihood of such a connection is higher in high-migration municipalities, then this could also induce an upward bias in the estimated value of the coefficient α_2 for the interaction term.

These concerns can be greatly mitigated by exploiting a key feature of the ENOE: information on the receipt of remittances is available separately for each household member aged 15 and above.[44] We can thus re-define the dependent variable in Eq. (4) and run a placebo

[43]For instance, a woman could join the household of her parents following her divorce or the illness of her mother, and her migrant brother could be sending remittances to help them.

[44]On average, there are 1.39 members that report receiving remittances in each recipient household, with

test by using only information on the receipt of remittances by initial household members, thus excluding the remittances received by the new members that joined the household over the observation period. The estimation sample includes 1,359 remittance-recipient households that record the arrival of a new member, and a new member reports to be directly receiving remittances in 304 of them. If new members previously co-resided with a migrant, then they should be reporting the receipt of remittances. Conversely, if they jointed a household with a previous unobserved or mis-reported migration episode, then remittances should be reported by individuals that appeared in the household roster already in the first interview. We thus define a dummy variable $r_{ks}^{'q}$ that takes the value of 1 if initial members in household k reported the receipt of remittances over the three-month recall period before interview s, with $s = 2, ..., 5$, and 0 otherwise. If a spurious positive correlation between the interaction term $n_{k[2-s]}^{q} * \text{high}_{m(k)}$ and the error term in Eq. (4) is driving the reported positive estimates for α_2 in Tables 7 and A.8-A.9, then this change in the definition of the dependent variable should not affect the results.

Table 8 reports the results from this placebo test for the entire sample of non-migrant households: once we only consider the receipt of remittances by initial household members, we obtain a precisely estimated zero effect of their arrival in households living in high-migration municipalities on the receipt of remittances, and the same holds when we restrict the sample to either urban or rural households (see Tables A.10-A.11 in the Appendix). The estimated association between the arrival of a new member in a high-migration municipality and the receipt of remittances from abroad is entirely driven by the remittances received directly from the new members.

Although this placebo test strongly corroborates the interpretation that these new members originate from dissolved households of origin of Mexican migrants, it does not suffice to rule out the possibility that these new members might have left a migrant household which has not dissolved, as migration is associated with a higher *un*conditional probability of losing one member (see Table 5). Two different, albeit not conclusive, arguments can be advanced to downplay the relevance of this alternative explanation. First, the cost of sending remittances from the United States to Mexico is proportionally higher for smaller

72 percent of the recipient individuals being either the household head or his or her spouse; in 69 percent of recipient households just have one member reporting to have received remittances from abroad.

amounts,[45] and this creates incentives for migrants to concentrate their transfers over a limited number of operations. This, in turn, entails that Mexican migrants are unlikely to make distinct transfers to various individuals they were co-residing with before migrating, while they could rather rely on internal transfers from the (unique) remittance-recipient household to other households within their family network to distribute the resources that they send back home. Thus, a household receiving just some rather than all the members of the household of origin of the migrant would be less likely to report the receipt of remittances from abroad. Second, migrant households with leaving members lose, on average, 1.84 members, and only 44 percent of them loses more than one member. The 304 non-migrant households with new members that report to have directly received remittances, which are driving our estimates (as shown by the placebo in Table 8), receive, on average, 2.27 new members, and 62 percent of them received more than one member (see Table A.12 in the Appendix). Furthermore, 81.6 percent of these 304 households received at least one adult woman, that is typically married, aged above 30 and who joins her new household together with one or more children. This, in turn, suggests that the results in Table 7 are not due to individuals that left non-dissolved migrant households, but rather to the dissolution of the household of origin of the migrants.

6 Analytical challenges and proposals

This section builds on the empirical evidence that we have provided analyzing the ENOE panel data to pursue a triple objective. First, it shows that the endogenous variations in co-residence choices induce an undercount of migration episodes recorded through retrospective questions in the survey connected to the 2000 Mexican Population Census, that prevents a correct identification of the households of origin of the migrants. Second, it describes what are the ensuing analytical challenges for the analysis of the prevailing pattern of migrants' selection and for the analysis of the effects of migration on those left behind. Third, it advances specific proposals for reducing the dependence of data collected at origin through retrospective questions with respect to the variations in co-residence choices of the individuals left behind.

[45] See http://remittanceprices.worldbank.org/en/corridor/United-States/Mexico (accessed on November 22, 2017).

6.1 Migration data from the 2000 Population Census

The survey connected to the 2000 Mexican Population Census, that was administered to a sample of the Mexican population, contained the following two questions, that were asked to one respondent for each household:

> (Question IV.1) "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?"

If a household provided an affirmative answer to Question IV.1, then the enumerator asked the number of persons had moved out of Mexico, and she wrote down the names of these migrants. Then, the enumerator verified the residency condition at the time of migration was fulfilled for each migrant that had been previously listed:

> (Question IV.5) "When [name of the migrant] left (for the last time), was he or she living with you?"

If the respondent provides an affirmative answer to Question IV.5, then the enumerator collects information on the migrant, while no information is collected if the residency condition is violated, and the record related to this migrant is deleted from the data. This condition is clearly met if there are no further variations in co-residence choices after the migrant left Mexico, e.g., case (i) in Section 2.1 above. Consider now case (ii) and (iii), where the individuals left behind by the migrant start co-residing with other individuals. If the resulting larger household is *not* perceived as representing the continuation of the household A of origin of the migrant, but rather of household B or C, then the migration episode of individual a_1 would remain unrecorded. Thus, the reference to "this household" in Question IV.1 introduces an element of subjectivity when variations in co-residence choices occur after the migration of individual a_1.[46] The perception of what "this household" is might depend, for instance, on whether the head of the larger household belonged or not to household A before, on the relative size (in either demographic or economic terms) of the two formerly separated households, or on whether the household currently lives in the housing unit that used to be occupied by household A. Whenever the individuals left behind are members of a household that is perceived to differ from the one to which the migrant belonged to when

[46] Notice that a similar situation arises when, after the occurrence of the migration episode, the household of origin of the migrant splits into two separate households.

she left Mexico, then variations in the co-residence choices and whole household migration produce the same key implication: migration episodes remain unrecorded.

How often migration episodes remain unrecorded because of variations in co-residence choices of those left behind? The public use micro-files of the 2000 Mexican Population Census only include observations related to the 195,701 migrants in the sample satisfying the residence condition described by Question IV.5. We submitted a formal request to the INEGI to know in how many cases the residency condition in Question IV.5 failed, and the INEGI informed us that this occurred in 23,178 cases, i.e., 10.6 percent of the total, but it declined our demand to receive the household identifiers corresponding to these cases. This number is not directly informative about the frequency of variations in co-residence choices for the individuals left behind by the migrant, as there are other instances in which the residency condition is violated,[47] and because respondents might have already given a negative answer to Question IV.1. We thus followed a different approach to get a sense of the actual relevance of the problems for data collection due to endogenous co-residence choices.

Specifically, we have identified all women in the sample that (*i*) are married, (*ii*) whose spouse does not belong to the same household, (*iii*) who were residing in Mexico in January 1995, and (*iv*) that report to directly receive remittances from abroad. These women are very likely to be married to a current migrant, and the sample includes 21,481 women satisfying simultaneously these four conditions, and let us refer to one of those women as the individual a_2. Let M be the set of current male migrants reported by the household to which woman a_2 belongs to (thus satisfying the residency condition in Question IV.5); for each migrant in the set M, we have information on his age (their marital status is unknown). We can thus search whether the set M includes a male migrant whose age entails that he might be the husband of woman a_2.[48] For 12,451 out of these 21,481 women (corresponding to 57.1 percent of the population) there is a male migrant reported in the set M who is likely to be married to a_2, i.e., the set M contains the individual a_1.

[47] This occurs for a current household member who is a returnee but who belonged to a different household when she left Mexico, or for a migrant who used to live in the surveyed household but who had left the household before migrating; in these two cases, respondents should give an affirmative answer to Question IV.1 but then a negative answer to Question IV.5.

[48] The data from the extended questionnaire of the 2000 Population Census reveals that the difference between the age of the husband and the age of the wife belongs to the range $[-3, 14]$ for 90 percent of the couples in which both spouses are present; we thus search for a male migrant in M who is no more than 14 years older or 3 years younger than woman a_2.

Table 9: Married women with an absent spouse

	Dependent variable: husband reported as migrant	
	(1)	(2)
Household head	0.243***	0.311***
	(0.007)	(0.008)
Adjusted-R^2	0.047	0.156
Observations	21,481	21,481
Dummies for age	No	Yes

Notes: ***, ** and * denote significance at the 1, 5 and 10 percent level respectively; sample restricted to married woman whose husband does not belong to the same household, who were residing in Mexico in January 1995, and that report to be receiving remittances from abroad; the dependent variable is a dummy taking the value of 1 if the likely husband of the woman is reported as a current migrant by the surveyed household, and 0 otherwise; sampling weights used in the estimation.
Source: Authors' elaboration on the extended questionnaire from the 2000 Mexican Population Census.

Is the probability that her (likely) husband is reported as a current migrant related to the occurrence of variations in co-residence choices? The data contain no information on this, but we can rely on a proxy represented by the relationship of the married woman a_2 with the household head. If woman a_2 is the household head herself, then this increases the likelihood that either no variations in co-residence choices have occurred, or that these variations are perceived to have occurred in a household that is still the continuation of the household of origin of the migrant husband. If, for instance, the wife left behind started co-residing, as suggested by Boehm (2012), with her parents or parents-in-law, then this would reduce the likelihood that woman a_2 is reported as the head, and the increase the likelihood that the household she lives in is *not* perceived as being the same to which the migrant belonged to.

The share of married women whose husband belongs to the set of current migrants

stands at 63.7 percent when the woman is the household head (15,802 observations), and it goes down to 39.3 percent otherwise (5,679 observations).[49] The observed difference gets magnified to 31.1 percentage points when we control for differences in the age structure of these two groups of women (see Table 9), as household heads are, on average, seven years older, and their (older) husbands are more likely to have moved out of Mexico before January 1995, so that they are outside the scope of Question IV.1. Thus, variations in the co-residence choices of the wives left behind occurring after the migration of their husbands substantially increase the likelihood that these migration episodes remain unrecorded because of the failure of the residency condition.

6.2 Implications for the economic analysis

What are the implications for the economic analysis that arise from the dependency of the data collected at origin on variations in co-residence choices? Consider McKenzie and Rapoport (2010), who analyze how the size of migrant networks at origin influences the pattern of selection on education of Mexican migrants using data from the ENADID survey collected in Mexico in 1997, which adopts the same retrospective questions on migration as the 2000 Mexican Population Census. A threat to their analysis is represented by whole household migration, as Mexican migrants that move with their entire household and thus remain unrecorded in the ENADID 1997 might have a different level of education that those whose migration episodes are enumerated in the survey. As Ibarraran and Lubotsky (2007), McKenzie and Rapoport (2010) consider that Mexican migrants that are married and that co-reside with their spouses in the United States are "likely not to be reported on in Mexico-based surveys" (p. 814), as they probably migrated with their whole household. This, in turn, motivates their choice to restrict their analysis to male migrants, as the share of recent male Mexican migrants to the United States that are married with the spouse present is substantially lower than for women (14.4 and 48.3 percent respectively, using data from the 2000 US Population Census). Interestingly, the share of male Mexican migrants that are married but whose spouse is absent, i.e., likely to be residing in Mexico, stands at 26.9 percent (McKenzie and Rapoport, 2010, p. 814), almost two times larger than the share of those that have migrated with their whole household. Our analysis in Section 6.1 entails

[49] 74.9 percent of these 5,679 women are either daughters or daughters-in-law of the household head, consistently with the description provided by Boehm (2012).

that a part of these migrants remain unrecorded in the ENADID. McKenzie and Rapoport (2010) write that "[f]or males, the ENADID is likely to measure 86 percent of migrants" (p. 814), but the actual coverage could be significantly lower than this. This might bias the observed pattern of selection on education even when correcting, as McKenzie and Rapoport (2010) do, for whole household migration. The level of education of the male migrants that remain unrecorded in the ENADID 1997 because of variations in the co-residence choices could differ both from the one of the migrants that are observed in the data, and from the one of those that remain unobserved because of whole household migration.[50]

Variations in co-residence choices have an impact on the analysis of the effects of migration on those left behind that depend on (*i*) the wedge between the composition of the household of origin of the migrant and the one that is observed in the data,[51] and (*ii*) on the incorrect classification of some households as untreated when a migration episode goes unrecorded because of the residency condition is violated.[52] To give a concrete example, consider the estimation of the effect produced by migration on the labor supply of those left behind (see, for instance, Amuedo-Dorantes and Pozo, 2006). Imagine, for instance, that the variation in co-residence choices are induced by the need to take care of children or elderly individuals that were previously assisted by the migrant. The family members that join the household of origin of the migrant are likely to have (possibly unobservable) characteristics that give them a comparative advantage in household chores (Hamoudi and Thomas, 2014), and this can introduce a spurious negative correlation between the treatment (reporting a migrant) and the labor supply of the household members. Similarly, a wife left behind with her children by a husband who migrates to the United States that is active on the Mexican labor market could be more likely to join the household of her parents (as she needs support with her children), and this reduces the chances that the migration episode of her husband is recorded, so that she would be (incorrectly) regarded as untreated, thus contaminating the

[50]Fernández-Huertas Moraga (2011) provides evidence using data collected in the United States that male Mexican migrants that are married but whose spouse is absent have, on average, 0.4 years of schooling less than those who are married but with their spouse present, and a part of them remains unrecorded when asking retrospective questions that rely on the residency condition, such as the ENADID 1997 or the 2000 Mexican Population Census.

[51]The weaker family ties with the household head of the individuals that join the household could have an impact on the efficiency of the intra-household allocation of resources (Kazianga and Wahhaj, 2017).

[52]We retain here an exclusive focus on empirical analyses conducted at the household rather than at the family-level to be consistent with the features of the mostly commonly used survey data.

control group. This possible positive correlation between the probability of occurrence of a variation in co-residence choices and the labor supply of the woman left behind would also introduce a downward bias in the estimation.

A fuller understanding of these biases requires better data, that would allow characterizing who are the migrants whose migration episodes go unrecorded because of the endogeneity of co-residence choices, and who are the left behind that we are unable to identify as such. This, in turn, requires adjusting the questions that are used to elicit information from non-migrants.

6.3 Proposals for adjusting data collection at origin

Reducing the dependency of the data gathered through retrospective questions with respect to variations in co-residence choices of the individuals left behind requires relaxing the residency condition at the time of migration recommended by UNDESA (2017). Specifically, imagine that one is interested, as the 2000 Mexican Population Census, to collect information on the migration episodes that have occurred in the five years before the survey. Rather than asking a question such as Question IV.1 to just one respondent per household, the following question could be asked separately to the household head and to any current member of the surveyed household who has been co-residing with the household head for less than five years:

> (Question 1) "During the last five years, has any person that lived with you gone to live in another country?"

This would represent a (not yet tested) attempt to capture the migration episodes of individuals who were co-residing with a current international migrant in a different household. Indeed, the key difference with respect to the phrasing of Question IV.1 is that it does not require that the respondent and the migrant should have been co-residing "in this household". In case of an affirmative answer to Question 1, the enumerator should write down the number and the names of the migrants, and then ask, separately for each migrant, the following question:

> (Question 2) "When [name] left for the last time, was [name] living with you?"

When referring Questions 1 and 2 to other household members, the enumerator clarifies that these two questions only refer to migration episodes that have *not* been previously

reported by other household members.[53] These two questions allow eliciting information on the migration episode of any individual that was co-residing with at least one member of the surveyed household at the time of migration, albeit possibly in a different household. The residency condition in Questions 1 and 2 is weaker than the one reflected in Questions IV.1 and IV.5 in the extended questionnaire of the 2000 Mexican Population Census,[54] and it thus creates a risk of double-counting, as various individuals that were co-residing with the migrant at the time of (the last) migration could be living in different households in the country of origin at the time of the survey. The likely occurrence of a double-counting of the same migration episode could be, at least partly, verified by introducing two follow-up questions for each migrant:

> (Question 3) "When [name] left for the last time, was [name] living with other individuals that are currently not members of this household?"

and, in case of an affirmative answer:

> (Question 4) "Is at least one of these other individuals still living in this country?"

The risk of a double-counting is a concern if the data have to be used to analyze the prevailing pattern of migrant selection, while this is less the case if we are interested in the analysis of the effects of international migration on the left behind, as the same migrant could be related to individuals that are no longer co-residing. If this is the case, why then not relying, as we have done in Sections 5.1 and 6.1 above, on the information on the receipt of remittances from abroad to identify the households that are likely to include individuals who belonged to the household of origin of the migrant? This approach allows indirectly identifying some, but not all, of these households, as the data typically reveal that a large share of migrant households are not remittance-recipient (see, for instance, Barham and Boucher, 1998). Relying on the receipt of remittances as a proxy for the (unknown) migration status of a household can impart significant biases in the estimation of the effects of migration on those left behind (see Bertoli and Marchetta, 2014 on this).

[53] This could occur, for instance, if two members that joined the surveyed household, say, three years ago, were both co-residing with a migrant who had left four years ago, or if the migrant had left less than three years ago.

[54] A distinct advantage of the proposed two questions is that they get rid of the subjectivity connected to establishing whether the household of origin of the migrant and the surveyed household coincide or not.

What about information on the occurrence of international migration episodes obtained from variations in the household roster in surveys, such as the ENOE, with a longitudinal dimension? This approach is not exposed to the complications related to the (subjective) definition of what constitutes the continuation of the household of origin of the migrant discussed in Section 6.1 for cross-sectional surveys. However, as discussed in Section 2.3 above, detecting the occurrence of international migration episodes through variations in the household roster fails to record those episodes that are followed by the dissolution of the household of origin of the migrant, and the empirical relevance of this problem increases with the time elapsed between two consecutive interviews. Thus, retrospective questions such as those detailed in this section could be considered for inclusion also in panel surveys, in an attempt to tackle the challenges for data collection related to household dissolution.

7 Concluding remarks

Co-residence choices represent an under-studied topic in economics, where household composition is usually assumed to be orthogonal 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 the household composition. Our analysis of the data drawn from the *Encuesta Nacional de Ocupación y Empleo* reveals that this assumption, at least in the case of Mexico, is not plausible. The systematic association between international migration and variations in the co-residence choices of the individuals left behind leads to a non-reporting of migration episodes, as we show from the analysis of the data from the extended questionnaire of the 2000 Mexican Population Census.

This non-reporting poses threats for the analysis of migrant selection that are similar to the ones related to whole household migration. Nevertheless, the direction of the bias due to endogenous co-residence choices might not be the same as the one related to neglecting whole household migration. Analytical challenges also arise for the analysis of the effects of migration on the individuals left behind, as the households of origin experiencing further variations in their composition could differ along observable and unobservable dimensions with respect to other households of origin of the migrants. A fuller understanding of these analytical challenges, and the possibility to tackle them, requires adopting an approach

to data collection that is less dependent on the changes in the co-residence choices of the individuals left behind.

References

Alcaraz, C., D. Chiquiar, and A. Salcedo (2012): "Remittances, schooling, and child labor in Mexico," *Journal of Development Economics*, 97, 156–165.

Ambler, K. (2015): "Don't tell on me: Experimental evidence of asymmetric information in transnational households," *Journal of Development Economics*, 113, 52–69.

Amuedo-Dorantes, C. and S. Pozo (2006): "Migration, remittances, and male and female employment patterns," *American Economic Review*, 96, 222–226.

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

Angelucci, M., G. De Giorgi, M. A. Rangel, and I. Rasul (2010): "Family networks and school enrollment: Evidence from a randomized social experiment," *Journal of Public Economics*, 94, 197–221.

Angelucci, M., G. De Giorgi, and I. Rasul (2017): "Consumption and Investment in Resource Pooling Family Networks," *The Economic Journal*, DOI: 10.1111/ecoj.12534.

Ashraf, N., D. Aycinena, C. Martínez A, and D. Yang (2015): "Savings in transnational households: A field experiment among migrants from El Salvador," *Review of Economics and Statistics*, 97, 332–351.

Barham, B. and S. Boucher (1998): "Migration, remittances, and inequality: estimating the net effects of migration on income distribution," *Journal of Development Economics*, 55, 307–331.

Barsbai, T. and R. Thiele (2013): "Does Prime-Age Mortality Reduce Per-Capita Household Income? Evidence from Rural Zambia," *World Development*, 45, 51–62.

Batista, C., A. Lacuesta, and P. Vicente (2012): "Testing the 'brain gain' hypothesis: Micro evidence from Cape Verde," *Journal of Development Economics*, 97, 32–45.

Beaman, L. and A. Dillon (2012): "Do household definitions matter in survey design? Results from a randomized survey experiment in Mali," *Journal of Development Economics*, 98, 124–135.

Bertoli, S. and F. Marchetta (2014): "Migration, remittances and poverty in Ecuador," *Journal of Development Studies*, 50, 1067–1089.

Boehm, D. (2012): *Intimate Migrations: Gender, Family, and Illegality among Transnational Migrants*, New York University Press.

Cerrutti, M. and D. S. Massey (2001): "On the auspices of female migration from Mexico to the United States," *Demography*, 38, 187–200.

Chen, J. J. (2006): "Migration and imperfect monitoring: Implications for intra-household allocation," *American Economic Review*, 96, 227–231.

——— (2013): "Identifying non-cooperative behavior among spouses: Child outcomes in migrant-sending households," *Journal of Development Economics*, 100, 1–18.

Chort, I. and J.-N. Senne (2015): "Selection into Migration within a Household Model: Evidence from Senegal," *World Bank Economic Review*, 29, S247–S256.

——— (2018): "You'll be a migrant my son: Accounting for migrant selection within the household," *Economic Development and Cultural Change*, 66, 217–263.

Clemens, M. A. and E. R. Tiongson (2017): "Split Decisions: Household Finance When a Policy Discontinuity Allocates Overseas Work," *Review of Economics and Statistics*, 99, 531–543.

de Laat, J. (2014): "Household allocations and endogenous information: The case of split migrants in Kenya," *Journal of Development Economics*, 106, 108–117.

Dustmann, C., F. Fasani, F. Meng, and L. Minale (2017): "Risk attitudes and household migration decisions," Discussion Paper Series 14/15, Centre for Research & Analysis of Migration.

Edmonds, E. V., K. Mammen, and D. L. Miller (2005): "Rearranging the family? Income support and elderly living arrangements in a low-income country," *Journal of Human Resources*, 40, 186–207.

Fafchamps, M. and A. R. Quisumbing (2008): "Household Formation and Marriage Markets in Rural Areas," in *Handbook of Development Economics*, ed. by T. P. Schultz and J. A. Strauss, Elsevier, vol. 4, pp. 3187–3247.

Fernández-Huertas Moraga, J. (2011): "New evidence on emigrant selection," *Review of Economics and Statistics*, 93, 72–96.

——— (2013): "Understanding different migrant selection patterns in rural and urban Mexico," *Journal of Development Economics*, 103, 182–201.

Foster, A. D. and S. Milusheva (2015): "Household Recombination and Retrospective Evaluation: Evidence from a Health and Family Planning Experiment," BREAD Working Paper No. 460.

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

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

Gutierrez, E., L. Juarez, and A. Rubli (2017): "The Effect of a Transfer Program for the Elderly in Mexico City on Co-Residing Children's School Enrollment," *World Bank Economic Review*, 31, 809–828.

Hamilton, E. R. and R. Savinar (2015): "Two sources of error in data on migration from Mexico to the United States in Mexican household-based surveys," *Demography*, 52, 1345–1355.

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

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

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

Massey, D. S., J. Arango, G. Hugo, A. Kouaouci, A. Pellegrino, and J. E. Taylor (1993): "Theories of international migration: A review and appraisal," *Population and Development Review*, 19, 431–466.

McKenzie, D. J. and H. Rapoport (2010): "Self-selection patterns in Mexico-US migration: The role of migration networks," *Review of Economics and Statistics*, 92, 811–821.

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

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

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

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

Stark, O. and D. E. Bloom (1985): "The new economics of labor migration," *American Economic Review*, 75, 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., L. Rubalcava, and E. Arenas (2012): "Migration in the Mexican Family Life Survey," in *Migration and Remittances from Mexico: Trends, Impacts, and New Challenges*, ed. by A. Cuecuecha and C. Pederzini, Lexington Books, pp. 15–36.

UNDESA (2017): *Handbook on Measuring International Migration through Population Censuses*, Statistical Commission, United Nations Department of Economic and Social Affairs.

Wong, R., E. Resano, and I. Martínez (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," *Economic Journal*, 118, 591–630.

A Appendix

Table A.1: Structure of the sample

	Interview					
	1^{st}	2^{nd}	3^{rd}	4^{th}	5^{th}	Total
Quarter						
2005Q1	20,919	0	0	0	0	20,919
2005Q2	21,114	19,534	0	0	0	40,648
2005Q3	21,189	19,581	18,454	0	0	59,224
2005Q4	21,088	19,769	18,622	17,605	0	77,084
2006Q1	21,534	19,853	18,840	17,924	17,130	95,281
2006Q2	21,444	20,251	18,931	18,109	17,359	96,094
2006Q3	21,508	20,108	19,222	18,161	17,547	96,546
2006Q4	21,510	20,189	19,162	18,461	17,569	96,891
2007Q1	0	20,303	19,374	18,480	17,952	76,109
2007Q2	0	0	19,421	18,661	17,950	56,032
2007Q3	0	0	0	18,572	18,013	36,585
2007Q4	0	0	0	0	17,648	17,648
Total	170,306	159,588	152,026	145,973	141,168	769,061

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

Table A.2: Non-attrited households with information on the receipt of remittances

	Interview					
	1^{st}	2^{nd}	3^{rd}	4^{th}	5^{th}	Total
Quarter						
2005Q1	17,129	0	0	0	0	17,129
2005Q2	17,356	17,121	0	0	0	34,477
2005Q3	17,543	17,357	17,128	0	0	52,028
2005Q4	17,568	17,547	17,354	17,126	0	69,595
2006Q1	17,950	17,567	17,545	17,355	17,130	87,547
2006Q2	17,945	17,948	17,568	17,544	17,359	88,364
2006Q3	0	0	0	0	0	0
2006Q4	0	0	0	0	0	0
2007Q1	0	0	0	0	0	0
2007Q2	0	0	17,647	18,011	17,949	53,607
2007Q3	0	0	0	0	0	0
2007Q4	0	0	0	0	0	0
Total	105,491	87,540	87,242	70,036	52,438	402,747

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

Table A.1: Migrant households and new members, excluding returnees

	Dependent variable: n_j^q					
	(1)	(2)	(3)	(4)	(5)	(6)
m_j^q	0.031***	0.015***	0.022***	0.017***	0.001	0.009
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Female migrant(s)				0.058***	0.059***	0.053***
				(0.014)	(0.014)	(0.014)
Adjusted-R^2	0.00	0.02	0.03	0.00	0.02	0.03
Observations	140,017	140,017	140,017	140,017	140,017	140,017
Controls	No	Yes	Yes	No	Yes	Yes
Municipality FE	No	No	Yes	No	No	Yes
$n_j^q \vert m_j^q = 0$	0.103	0.103	0.103	0.103	0.103	0.103
F-test controls		55.790	58.138		55.736	58.021

Notes: ***, ** and * denote significance at the 1, 5 and 10 percent level respectively; n_j^q is a dummy variable equal to 1 if household j reports at least one new member over the period of observation, and 0 otherwise; m_j^q is a dummy variable equal to 1 if household j reports at least one international migrant over the period of observation, and 0 otherwise; female is a dummy variable equal to 1 if at least one of the household members who migrate is a woman; 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 A.2: Relative timing of migration and of the arrival of new members

	Dependent variable: n^q_{js}		
	(1)	(2)	(3)
m^q_{js-3}	0.003	-0.002	-0.001
	(0.005)	(0.005)	(0.005)
m^q_{js-2}	0.023***	0.019***	0.020***
	(0.005)	(0.005)	(0.005)
m^q_{js-1}	0.025***	0.020***	0.021***
	(0.004)	(0.004)	(0.004)
m^q_{js}	0.018***	0.014***	0.014***
	(0.003)	(0.003)	(0.003)
m^q_{js+1}	0.010***	0.005	0.006
	(0.004)	(0.004)	(0.004)
m^q_{js+2}	0.004	-0.001	-0.000
	(0.004)	(0.004)	(0.004)
m^q_{js+3}	0.011*	0.008	0.008
	(0.006)	(0.006)	(0.006)
Controls	No	Yes	Yes
Municipality FE	No	No	Yes
$q \times s$ FE	Yes	Yes	Yes
Adjusted-R^2	0.00	0.00	0.01
F-test controls		57.158	58.300
Observations	564,672	564,672	564,672

Notes: *,** and *** denote significance at the 10, 5 and 1 percent confidence level respectively; each observation corresponds to a household-interview pair js, with $s = 2, ..., 5$; n^q_{js} is a dummy variable equal to 1 if household j reports one new member in the interview s and 0 otherwise; m^q_{jt}, with $t = s-3, ..., s+3$, is a dummy variable equal to 1 if household j reports one international migrant in the interview t, and 0 otherwise; all specifications include dummies for each quarter-interview pair qs; standard errors are clustered at the household level.

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

Table A.3: Migrant households and new members (urban areas)

	Dependent variable: n_j^q					
	(1)	(2)	(3)	(4)	(5)	(6)
m_j^q	0.084***	0.068***	0.072***	0.063***	0.045***	0.051***
	(0.009)	(0.009)	(0.009)	(0.010)	(0.010)	(0.010)
Female migrant(s)				0.067***	0.073***	0.066***
				(0.020)	(0.020)	(0.020)
Adjusted-R^2	0.00	0.02	0.03	0.00	0.02	0.03
Observations	99,746	99,746	99,746	99,746	99,746	99,746
Controls	No	Yes	Yes	No	Yes	Yes
Municipality FE	No	No	Yes	No	No	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
$n_j^q \vert m_j^q = 0$	0.107	0.107	0.107	0.107	0.107	0.107
F-test controls		43.211	44.830		43.250	44.844

Notes: ***, ** and * denote significance at the 1, 5 and 10 percent level respectively; standard errors are robust to heteroskedasticity; n_j^q is a dummy variable equal to 1 if household j reports at least one new member over the period of observation, and 0 otherwise; m_j^q is a dummy variable equal to 1 if household j reports at least one international migrant over the period of observation, and 0 otherwise; female is a dummy variable equal to 1 if at least one of the household members who migrate is a woman; 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 A.4: Migrant households and new members (rural areas)

	Dependent variable: n_j^q					
	(1)	(2)	(3)	(4)	(5)	(6)
m_j^q	0.021***	0.006	0.002	0.013	0.001	-0.003
	(0.008)	(0.008)	(0.008)	(0.009)	(0.009)	(0.009)
Female migrant(s)				0.045**	0.032	0.028
				(0.022)	(0.022)	(0.022)
Adjusted-R^2	0.00	0.02	0.05	0.00	0.02	0.05
Observations	41,422	41,422	41,422	41,422	41,422	41,422
Controls	No	Yes	Yes	No	Yes	Yes
Municipality FE	No	No	Yes	No	No	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
$n_j^q \vert m_j^q = 0$	0.116	0.116	0.116	0.116	0.116	0.116
F-test controls		21.046	21.143		20.939	21.035

Notes: ***, ** and * denote significance at the 1, 5 and 10 percent level respectively; standard errors are robust to heteroskedasticity; n_j^q is a dummy variable equal to 1 if household j reports at least one new member over the period of observation, and 0 otherwise; m_j^q is a dummy variable equal to 1 if household j reports at least one international migrant over the period of observation, and 0 otherwise; female is a dummy variable equal to 1 if at least one of the household members who migrate is a woman; 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 A.5: Migration and attrition (urban areas)

	Dependent variable: a^q_{js}					
	(1)	(2)	(3)	(4)	(5)	(6)
$m^q_{j[2;s]}$	0.007*	0.015***	0.017***	0.003	0.008*	0.011**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Female migrant(s)				0.012	0.022***	0.020**
				(0.008)	(0.008)	(0.008)
Adjusted-R^2	0.00	0.02	0.02	0.00	0.02	0.02
Observations	325,934	325,934	325,934	325,934	325,934	325,934
Controls	No	Yes	Yes	No	Yes	Yes
Municipality FE	No	No	Yes	No	No	Yes
$q \times s$ FE	Yes	Yes	Yes	Yes	Yes	Yes
$a^q_{js} \vert m^q_j = 0$	0.045	0.045	0.045	0.045	0.045	0.045
F-test controls		134.722	130.789		134.860	130.926

Notes: ***, ** and * denote significance at the 1, 5 and 10 percent level respectively; a^q_{js} is a dummy variable signaling whether household j drops out of the sample between interview s and $s+1$; $m^q_{j[2;s]} \equiv \max\{m^q_{j2}, ..., m^q_{js}\}$; female is a dummy variable equal to 1 if at least one of the household members who migrate is a woman; 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; standard errors are clustered at the household level.

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

Table A.6: Migration and attrition (rural areas)

	Dependent variable: a^q_{js}					
	(1)	(2)	(3)	(4)	(5)	(6)
$m^q_{j[2;s]}$	-0.004	0.001	0.004	-0.009***	-0.005*	-0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Female migrant(s)				0.028***	0.034***	0.028***
				(0.009)	(0.009)	(0.009)
Adjusted-R^2	0.00	0.01	0.03	0.00	0.01	0.03
Observations	131,653	131,653	131,653	131,653	131,653	131,653
Controls	No	Yes	Yes	No	Yes	Yes
Municipality FE	No	No	Yes	No	No	Yes
$q \times s$ FE	Yes	Yes	Yes	Yes	Yes	Yes
$a^q_{js} \vert m^q_j = 0$	0.030	0.030	0.030	0.030	0.030	0.030
F-test controls		33.189	30.450		33.309	30.547

Notes: ***, ** and * denote significance at the 1, 5 and 10 percent level respectively; a^q_{js} is a dummy variable signaling whether household j drops out of the sample between interview s and $s+1$; $m^q_{j[2;s]} \equiv \max\{m^q_{j2}, ..., m^q_{js}\}$; female is a dummy variable equal to 1 if at least one of the household members who migrate is a woman; 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; standard errors are clustered at the household level.

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

Table A.7: Relative timing of migration and attrition

	Dependent variable: a^q_{js}		
	(1)	(2)	(3)
m^q_{js-2}	-0.005	0.003	0.007
	(0.005)	(0.005)	(0.005)
m^q_{js-1}	-0.008**	0.003	0.007*
	(0.004)	(0.004)	(0.004)
m^q_{js}	0.003	0.010***	0.014***
	(0.004)	(0.004)	(0.004)
Controls	No	Yes	Yes
Municipality FE	No	No	Yes
$q \times s$ FE	Yes	Yes	Yes
Adjusted-R^2	0.00	0.02	0.02
F-test controls		168.460	160.504
Observations	457,587	457,587	457,587

Notes: *,** and *** denote significance at the 10, 5 and 1 percent confidence level respectively; each observation corresponds to a household-interview pair js, with $s = 2, ..., 4$; a^q_{js} is a dummy variable equal to 1 if household j attrites in interview s, and 0 otherwise; m^q_{jt}, with $t = s-2, ..., s$, is a dummy variable equal to 1 if household j reports one international migrant in the interview t, and 0 otherwise; standard errors are clustered at the household level.

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

Table A.8: Receipt of remittances by non-migrant households (urban areas)

	Dependent variable: r^q_{ks}					
	(1)	(2)	(3)	(4)	(5)	(6)
$n^q_{k[2;s]}$	0.0135**	0.0060***	0.0107***	0.0031	0.0103***	0.0032*
	(0.0021)	(0.0019)	(0.0021)	(0.0019)	(0.0020)	(0.0019)
$n^q_{k[2;s]} * \text{high}_{m(k)}$		0.0170***		0.0171***		0.0150***
		(0.0042)		(0.0042)		(0.0042)
Adjusted-R^2	0.00	0.01	0.01	0.02	0.03	0.03
Observations	204,976	204,976	204,976	204,976	204,976	204,976
Controls	No	No	Yes	Yes	Yes	Yes
Municipality FE	No	No	No	No	Yes	Yes
$q \times s$ FE	Yes	Yes	Yes	Yes	Yes	Yes
$r^q_{ks} \vert n^q_{k[2;s]} = 0$	0.024	0.024	0.024	0.024	0.024	0.024
$r^q_{ks} \vert n^q_{k[2;s]} = 0, \text{high}_{m(k)} = 1$	0.035	0.035	0.035	0.035	0.035	0.035
F-test controls			34.965	34.438	33.417	33.420

Notes: ***, ** and * denote significance at the 1, 5 and 10 percent level respectively; $r^q_{ks} = 1$ if household k entering the ENOE sample in quarter q reported receiving remittances from abroad over a three-month recall period before interview s, $n^q_{k[2;s]} = 1$ if household k received a new member in any interview up to s, and $\text{high}_{m(k)}$ is a dummy signaling whether household k resides in a high-migration urban municipality; sample does not include households with new member(s) returning from the United States.

Source: Authors' elaboration on ENOE, 2005Q1-2007Q2 and on the 2000 Mexican Population Census; standard errors are clustered at the household level.

Table A.9: Receipt of remittances by non-migrant households (rural areas)

	Dependent variable: r^q_{ks}					
	(1)	(2)	(3)	(4)	(5)	(6)
$n^q_{k[2;s]}$	0.0198***	0.0119**	0.0164***	0.0090*	0.0186***	0.0059
	(0.0052)	(0.0050)	(0.0051)	(0.0051)	(0.0049)	(0.0050)
$n^q_{k[2;s]} * \text{high}_{m(k)}$		0.0207**		0.01871*		0.0267***
		(0.0103)		(0.0101)		(0.0098)
Adjusted-R^2	0.00	0.03	0.04	0.07	0.13	0.13
Observations	81,562	81,562	81,562	81,562	81,562	81,562
Controls	No	No	Yes	Yes	Yes	Yes
Municipality FE	No	No	No	No	Yes	Yes
$q \times s$ FE	Yes	Yes	Yes	Yes	Yes	Yes
$r^q_{ks} \vert n^q_{k[2;s]} = 0$	0.069	0.069	0.069	0.069	0.069	0.069
$r^q_{ks} \vert n^q_{k[2;s]} = 0, \text{high}_{m(k)} = 1$	0.116	0.116	0.116	0.116	0.116	0.116
F-test controls			43.696	41.790	35.463	35.417

Notes: ***, ** and * denote significance at the 1, 5 and 10 percent level respectively; $r^q_{ks} = 1$ if household k entering the ENOE sample in quarter q reported receiving remittances from abroad over a three-month recall period before interview s, $n^q_{k[2;s]} = 1$ if household k received a new member in any interview up to s, and $\text{high}_{m(k)}$ is a dummy signaling whether household k resides in a high-migration rural municipality; sample does not include households with new member(s) returning from the United States.

Source: Authors' elaboration on ENOE, 2005Q1-2007Q2 and on the 2000 Mexican Population Census; standard errors are clustered at the household level.

Table A.10: Placebo on the receipt of remittances by non-migrant households (urban areas)

	Dependent variable: $r_{ks}^{'q}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$n_{k[2;s]}^{q}$	0.0026	-0.0004	-0.0003	-0.0033**	-0.0006	-0.0033**
	(0.0018)	(0.0016)	(0.0017)	(0.0016)	(0.0017)	(0.0016)
$n_{k[2;s]}^{q} * \text{high}_{m(k)}$		0.0075**		0.0075**		0.0055
		(0.0036)		(0.0035)		(0.0035)
Adjusted-R^2	0.00	0.01	0.02	0.02	0.03	0.03
Observations	204,976	204,976	204,976	204,976	204,976	204,976
Controls	No	No	Yes	Yes	Yes	Yes
Municipality FE	No	No	No	No	Yes	Yes
$q \times s$ FE	Yes	Yes	Yes	Yes	Yes	Yes
$r_{ks}^{'q} \vert n_{k[2;s]}^{q} = 0$	0.024	0.024	0.024	0.024	0.024	0.024
$r_{ks}^{'q} \vert n_{k[2;s]}^{q} = 0, \text{high}_{m(k)} = 1$	0.035	0.035	0.035	0.035	0.035	0.035
F-test controls			35.765	35.256	34.271	34.272

Notes: ***, ** and * denote significance at the 1, 5 and 10 percent level respectively; $r_{ks}^{'q} = 1$ if initial household members in household k reported receiving remittances from abroad over a three-month recall period before interview s, $n_{k[2;s]}^{q} = 1$ if household k received a new member in any interview up to s, and $\text{high}_{m(k)}$ is a dummy signaling whether household k resides in a high-migration urban municipality; sample does not include households with new member(s) returning from the United States; standard errors are clustered at the household level.

Source: Authors' elaboration on ENOE, 2005Q1-2007Q2 and on the 2000 Mexican Population Census.

Table A.11: Placebo on the receipt of remittances by non-migrant households (rural areas)

	Dependent variable: $r^{'q}_{ks}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$n^q_{k[2;s]}$	0.0005	0.0032	-0.0029	0.0003	-0.0006	-0.0026
	(0.0047)	(0.0046)	(0.0046)	(0.0047)	(0.0044)	(0.0047)
$n^q_{k[2;s]} * \text{high}_{m(k)}$		-0.0017		-0.0036		0.0042
		(0.0092)		(0.0091)		(0.0088)
Adjusted-R^2	0.00	0.03	0.04	0.07	0.13	0.13
Observations	81,562	81,562	81,562	81,562	81,562	81,562
Controls	No	No	Yes	Yes	Yes	Yes
Municipality FE	No	No	No	No	Yes	Yes
$q \times s$ FE	Yes	Yes	Yes	Yes	Yes	Yes
$r^q_{ks} \vert n^q_{k[2;s]} = 0$	0.069	0.069	0.069	0.069	0.069	0.069
$r^{'q}_{ks} \vert n^q_{k[2;s]} = 0, \text{high}_{m(k)} = 1$	0.116	0.116	0.116	0.116	0.116	0.116
F-test controls			43.432	41.626	35.362	35.343

Notes: ***, ** and * denote significance at the 1, 5 and 10 percent level respectively; $r^{'q}_{ks} = 1$ if initial household members in household k reported receiving remittances from abroad over a three-month recall period before interview s, $n^q_{k[2;s]} = 1$ if household k received a new member in any interview up to s, and $\text{high}_{m(k)}$ is a dummy signaling whether household k resides in a high-migration rural municipality; sample does not include households with new member(s) returning from the United States; standard errors are clustered at the household level.
Source: Authors' elaboration on ENOE, 2005Q1-2007Q2 and on the 2000 Mexican Population Census.

Table A.12: New and leaving members in migrant and non-migrant households

Household migration status	Non-migrant	Migrant	Non-migrant		
Type of members	New	Leaving	New		
Direct receipt of remittances	Yes		No		

Panel A - Household characteristics

				Differences	
	(1)	(2)	(3)	(2)-(1)	(3)-(1)
Number of (new or leaving) members	2.273	1.842	1.746	-0.431***	-0.527***
At least two (new or leaving) members	0.612	0.440	0.378	-0.172***	-0.234***
At least one woman	0.816	0.643	0.585	-0.173***	-0.231***
At least one child	0.516	0.035	0.316	-0.481***	-0.201***
At least one elderly	0.151	0.024	0.080	-0.127***	-0.071***
Observations	304	818	13,732	1,122	14,036

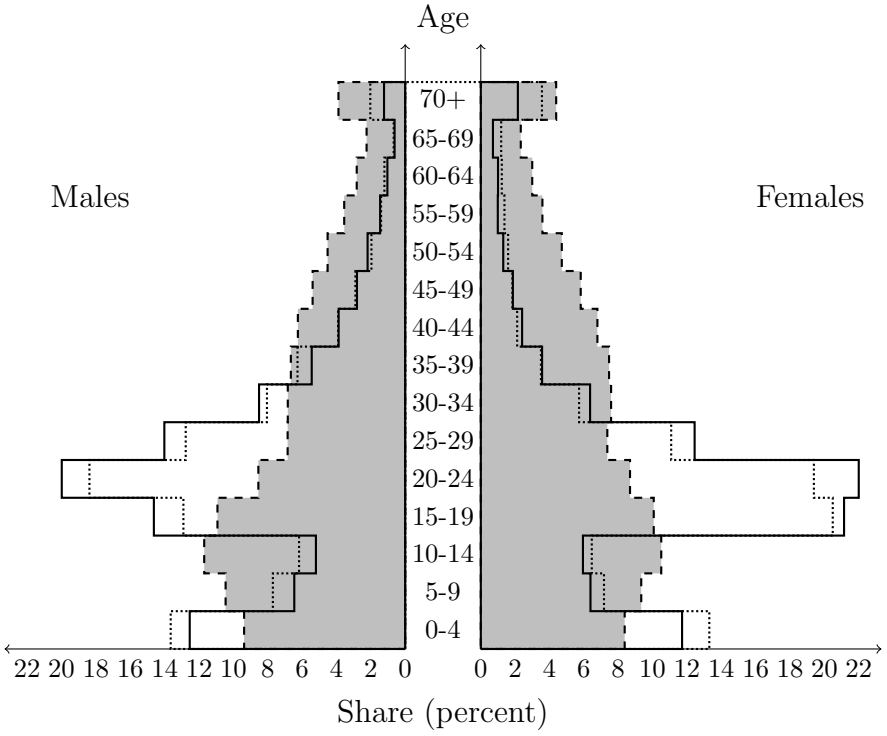
Panel B - Individual characteristics

				Differences	
	(1)	(2)	(3)	(2)-(1)	(3)-(1)
Children (0-14)	0.391	0.289	0.276	-0.101***	-0.115***
Elderly (60+)	0.072	0.021	0.050	-0.051***	-0.023**
Women among adult (15+)	0.722	0.572	0.520	-0.150***	-0.203***
Age of women (15+)	32.266	25.104	29.404	-7.162***	-2.863**
Age of men (15+)	32.974	27.552	30.325	-5.422***	-2.650*
Single among men (15+)	0.444	0.590	0.421	0.145**	-0.023
Single among women (15+)	0.266	0.494	0.331	0.228***	0.064*
Observations	691	1,507	23,982	2,198	24,673

Notes: ***, ** and * denote significance at the 1, 5 and 10 percent level respectively; the first (third) data column refers to non-migrant households with new members that report (do not report) to have received remittances from abroad; the second data column refers to migrant households with leaving members.

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

Figure A.1: Age pyramid for initial, new and leaving household members



Notes: the shaded area represents the age structure of individuals in the household roster in the first interview, while the dotted (solid) line represents the age structure of new (leaving) members; the sample is restricted to households successfully interviewed for five quarters.
Source: Authors' elaboration on ENOE 2005Q1-2007Q4.