Estimating the Age- and Duration-Specific Rates of Out-Migration among Foreign Born Workers: Evidence from French Pension Data

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Abstract

Little is known about the magnitude, age patterns, and timing of out-migration among all immigrants to a single receiving country, despite important policy implications. This paper bridges these gaps by drawing on French pension data covering the foreign born from a wide variety of sending countries, whether they still reside in France or have moved abroad. The data provide a unique opportunity to examine the magnitude of the departures from this major immigrant-receiving country by age, duration of stay, and country of origin. We find that over one-third of male foreign born who worked in France out-migrate before retirement. This proportion ranges between 19 and 64 percent for the Morocco born and the Spain born, respectively. While out-migration is experienced through immigrants' entire life, it mostly peaks in the early thirties and around the ages of retirement. The foreign born who out-migrate often do so before 40 years of age, within 10 to 15 years of their arrival in France. Our results further reveal marked differences in the age- and duration-specific rates of out-migration by country of origin. Finally, they highlight the importance of longitudinal data that capture migrant movements across international borders for the study of migration**.**

1) Introduction

In the context of population aging, international migration appears as a potent force in population dynamics in several countries (Castles, De Haas, and Miller, 2014). But immigration has become a growing divisive policy issue in most receiving countries, where the magnitude of incoming flows often heightens concerns about rapid growth of the foreign born population. In particular, the proportion of foreign born perceived by natives bears no relation with reality, being overestimated on average by two or three times in the US and in most European countries (Citrin and Sides, 2008). Among other potential causes of that misperception, Willekens et al. (2016) points out the disproportionate attention paid to arrival flows of foreign born in comparison to departure flows from receiving countries. Foreign born are overwhelmingly perceived as permanent settlers (Blinder 2015) while in fact many do not stay permanently in a receiving country and eventually remigrate.

Emigration of immigrants is a particularly overlooked population dynamic in receiving countries (Beauchemin, 2014; Dustmann and Görlach, 2016). Migration back to the origin country (return migration) as well as subsequent migration toward other countries (onward migration) are often set aside. If returnees are not (anymore) "barely noticed by social scientists" (Gmelch, 1980), this issue remains mostly confined to a body of literature specifically devoted to it. The scope of numerous but often very specific case studies is generally limited to one subgroup of foreign born observed during a limited time period. Thus, the full magnitude of remigration from the perspective of the receiving

country remains mostly unknown, sustaining "the myth of no return". [1] And the idea that these flows matter little still prevails in a sizable portion of the literature about immigrants. Available data on emigration of natives are often scarce and of questionable quality, those of immigrants are even more lacking (Cassarino, 2004), contributing to the lack of attention in the literature and the misconception in the public.[2] However, fragmentary but consistent findings reveal that foreign born experience high rates of remigration. It has been repeatedly shown that a large part of incoming migrants only stay temporarily in their receiving country (Piore, 1979; Warren and Peck, 1980; Jasso and Rosenzweig, 1982; Duleep, 1994; Borjas and Bratsberg, 1996; Van Hook et al., 2006; Dustmann and Görlach, 2016): within 10 years after arrival, estimates range from 20 to 50 percent in the United States, Canada, Australia, New-Zealand as well as in European countries. But most estimates remain uncertain due to data and methodological issues, calling for leveraging new data to develop robust approaches.

While the full magnitude of remigration among foreign born has still to be studied in a more comprehensive way in most countries, understanding its patterns and timing is also crucial. The impact of remigration on immigration outcomes for both migrants and their host country not only depends on the number of foreign born leaving their host country but also when it happens in their life course. Long-run comparative analyses of immigrants

[1] King (2000) borrowing that phrase from Sarna (1981). He starts his own article by noticing that "Return migration is the great unwritten chapter in the history of migration".

[2] Although Ravenstein's fourth migration law stating that *« Each main current of migration produces a compensating counter-current »* is often seen as an early reference to return migration, it is worth noticing that this type of flows is precisely excluded due to the lack of data: *"This counter-current is not by any means composed of migrants who return homeward disappointed in their hopes or in the possession of a competency, for ex-migrants of this class are included in the native county element, and no data for even approximatively determining their number is in our possession."* (Ravenstein, 1885)

with non-migrants requires a better understanding of how the immigrant stocks at different points in time relate to international migration flows, because selective remigration can distort any comparison over time (Constant and Massey, 2004; Flahaux, 2016). It has been shown that the evolution of foreign-born average characteristics observed in receiving countries can be partly driven by selective remigration, whether concerning occupation (Lubotsky, 2007, Abramitzky et al., 2014), homeownership (Gobillon and Solignac, 2019), mortality (Guillot et al., 2018)… Thus, foreign born converging with natives can rather reflect selective remigration than assimilation and integration.

Age at remigration can generate major discrepancies with direct implications for both origin and receiving countries. Whether foreign born workers remigrate "at the peak of their active and productive life" (Cerase, 1974) or once they retired can shape the economic and demographic impact of international migration in very different ways. However, as pointed out by Dustmann and Görlach (2015) in their literature survey on outmigration of immigrants, the relative importance of remigration after retirement compared to remigration during active working life remains unclear. While some studies highlight sizable out-migration rates around retirement age (Cobb-Clark and Stillman, 2013; Constant and Massey, 2003) or at older ages (Giner-Monfort et al., 2016), others find higher out-migration rates among prime-working-age foreign born (Van Hook et al., 2006, 2011; Bijwaard, 2010).

The aim of this paper is to provide comprehensive estimates of the magnitude and the age pattern of outmigration of foreign born workers from a receiving country. We seek to examine whether outmigration happens when the foreign born are still in their prime

working ages, around retirement age, or even later on. We also want to investigate how age-specific out-migration rates vary by country of origin. In the American context, Jasso and Rosenzweig (1982) highlight notable differences between immigrants from various countries. We can assess whether this finding holds in a European context and further investigate whether the age patterns are different. One important strength of our study relative to the existing literature on the topic is our use of a unique dataset with features that are particularly well-suited for studying remigration . This dataset is drawn from the French pension system and consists of panel data with trajectories of foreign born pensioners from their first contribution to the French pension system till their death (or the end of the observation period), no matter where they reside in the world. The data include foreign born who already out-migrated as well as those who are still located in France, offering a unique opportunity to study out-migration over their lifetime. France is an old country of immigration[3] representing the third most important immigrant-receiving country in Europe (behind Germany and the UK). Piece-wise exponential regressions are used to estimate rates, which help to calculate cumulative probabilities of staying in France. Our results indicate that a large share of the foreign born out-migrate. They also highlight the fact that out-migration occurs overwhelmingly before retirement with marked differences across countries of origin.

The rest of the article proceeds as follows. Section 2 elaborates on the background of this study. The lack of knowledge about outmigration of foreign born on overall is

[3] At the end of the 19th century, Ravenstein was noticing that "Persons born abroad are more numerous in France than in any other country of Europe." (Ravenstein, 1889)

illustrated by the mixed results obtained in the literature about how these flows may vary with age. A reviews of the methods implemented for measuring them introduces the general contribution of this study to the literature. Section 3 describes data and methods used in this article. Section 4 presents results, and Section 5 concludes the paper.

2) Background

Outmigration and age: an unsettled relationship

The relative importance of remigration after retirement compared to remigration during active working life remains unclear. On the one hand, some studies show high intention to return at older ages, close to retirement (Waldorf, 1995; De Coulon and Wolff, 2010) or close to death (Attias-Donfut and Wolff, 2005). Although all intentions are not realized, high out-migration rates have been measured around retirement age such as in Australia (Cobb-Clark and Stillman, 2013) and Germany (Constant and Massey, 2003), or later on among British in Spain (Giner-Monfort et al., 2016). Return of retirees can be motivated by various reasons: enjoy a higher purchasing power in their home country, reconnect with their native land, benefit from a more supportive environment for their old age… The "salmon bias" hypothesis which postulates that foreign born about to die are more likely to return also finds some indirect support in the shape of some mortality curves for foreign born at older ages (Palloni and Arias, 2004).

On the other hand, Ahmed and Robinson (1994) and Van Hook et al. (2006, 2011) in the US, and Bijwaard (2010) in the Netherlands found higher out-migration rates among

prime- working-age foreign born.[4] Remigration at younger age is in line with general theories of migration, such as Cerase's typology (1974) distinguishing three types of returnees besides retired ones. In addition to "returns of failure" by people who did not find the work or the living conditions good enough to stay more than a few years, there are people who reach their target in terms of accumulation of either savings or skills (Bovenkerk, 1974; Gmelch, 1980). Besides economic incentives, the level of attraction of the country of origin may evolve depending on the position in the life-cycle. Return may be motivated by the willingness to find a spouse, to have children educated in the home country, or to look after elderly (King 2000). All these factors can lead young or middle age foreign born to remigrate, as well as their partner and their children, if any.[5]

In contrast with this opposition, Duleep (1994) suggests that, although the age distribution of remigrants may be concentrated upon retirement, other age thresholds related to the welfare system may have the same effect. In the US, it would be the case for the age at which foreign born get eligible for the social security insurance after working there for long enough (ten years). Thus, the age of remigrants would be distributed around these two thresholds at middle age and retirement age. But there are also other works like Edin et al. (2000) which does not find a significant association in Sweden between the age of foreign born and their probability of emigrating. It worth noticing that these results about the age pattern of remigration have been obtained using a wide range of data source, methods and restrictions on specific subgroups in order to compensate the general lack of

[4] Very high level of return migration are also observed among international students (Bijwaard and Wang, 2016)
[5] Partners and children born abroad contribute to foreign born remigration, while those born in the country contribute to native emigration. As a result, part of the emigration attributed to natives can be directly driven by foreign born remigration.

direct data on emigration flows of immigrants. Moreover, even when available, direct data on remigration are often incomplete. The purpose of the following overview of methods for measuring remigration is to underline their main advantages and drawbacks in order to help situate the contribution of this article.

Direct approaches for measuring remigration and their limits

First, population registers are supposed to provide a direct measure of emigration for countries equipped with one. However, these permanent records of the population in the country do not necessarily include all foreign born. The follow-up of foreign born may rather reflect the evolution of their legal status rather than their actual presence in the country. Moreover, it has been shown that departures from the country are highly under-reported due to the absence of incentives to declare them (Poulain and Herm, 2013). The German population register has recently been used to survey emigrants (Ette et al., 2019). But this approach is restricted to German citizens, thus excluding a large part of the foreign born population.

Second, public administrations release data about remigration cases they are in charge (such as deportations) or involve with, such as voluntary return migration programs. One notable example using these data is the work conducted by Dustmann and Kirchkamp (2004) on Turkish immigrants in Germany who applied for return assistance and were interviewed before their departure and a few years after. However, these cases of monitored remigration are highly specific and their number highly dependent on the

evolution of the policy and its implementation. Therefore, they cannot provide an overview of remigration as a whole.[6]

Third, specific studies conducted in sending countries can provide life-histories of returnees, and thus a retrospective approach of return migration. In particular, multi-sited surveys (such as the Mexican Migration Project, the Latin American Migration Project, The Migration between Africa and Europe Project…) can help taking into account the full trajectory of migrants, including those who return but also those who stayed in the host country. Thus, they can provide detail insights on return migration and its determinants (Flahaux, 2017). But their scope is generally limited to one sending and one receiving country, or even to a specific region of the former (Beauchemin, 2015). From the perspective of the receiving country, these results are not necessarily representative of the behavior of foreign born from that country. Moreover, onward migrations to other destinations than the country of origin are missed. And given the cost of these studies, this type of data has only been collected in a few countries.

Fourth, some household panel surveys conducted in receiving countries identify some individuals as emigrants among those who left the household from one survey to the other. The German Socio-Economic Panel (SOEP) is one example of this kind. When some members of the initial household are still there, they can be asked if the others left the country. But when none are present, the distinction between internal and international

[6] Although data on immigration and international mobility are also compiled from other administrative sources (resident permits, customs…), they hardly provide a direct identification of remigration.

migration as the cause of that absence has to rely on what neighbors can report (Yahirun, 2014), although their knowledge in that matter may be much more limited.[7]

Fifth, combining nominative data from a sending and a receiving country can help identify returnees. Abramitzky et al. (2012, 2019) matched two complete censuses from Norway with enumerations of Norwegian immigrants observed in the US in-between. But access to nominative files restricted to old data and ex-post linkage has a rather low success rate. Linked register data between countries are an alternative (Rooth and Saarela, 2007), but limited to Sweden and Finland so far. It is also restricted to return migration, and hardly be generalized to all sending countries (especially low-income countries).

The contribution of indirect approaches

Based on the fundamental equation of population dynamics, an indirect approach of remigration can be developed using macro data. It relies on the enumeration of foreign born broken down by age at two different times. Based on the first enumeration and after taking into account mortality[8], expected number and age distribution of foreign born that should be observed the second time in absence of remigration can be calculated. It can be done for each cohort of foreign-born if the date of entry is known, otherwise in-migration flows during the intercensal period have to be taken into account. Expected figures are

[7] Moreover, the coverage of foreign born by the SOEP is mainly restricted to nationals from 5 countries recruited abroad to work in West Germany following bilateral treaties signed between 1955 and 1968 (Constant and Massey, 2003). Other immigrants, especially those who arrived more recently, have only been included in the sample starting mid-1990.

[8] Studies based nationality rather place (and nationality) at birth have also to take into account the number of foreigners getting citizenship from their receiving country.

compared to the actual figures, the difference being attributed to remigration. But it has several weaknesses. Estimating emigration as a residual component means that it includes errors made on the other components estimates. Any variation in the quality of the enumeration of foreign born will affect the emigration estimates. It can be due to different coverage of the survey or the census, non-response, inconsistency across time in the way people are reporting information used in the analysis[9]. Moreover, this analysis may miss some foreign born who arrived in-between the two enumerations and leave before the second one. Thus, the duration between the two enumerations may affect the results.

At the micro level, attrition observed in individual panel data includes outmigration. Once the other channels of attrition are taken into account, the remaining cases can be attributed to remigration (Van Hook et al., 2006). A major advantage of individual follow-up is that estimates are less sensitive to inconsistencies over time affecting macro approaches. However, not only mortality but also internal migration (not to mention unsuccessful matching[10]) have to be taken into account. Their magnitude is approximated by general estimates from other data sources. Thus, while attrition is measured through individual follow-up, the measure of remigration still depends on macro estimates. Above all, internal migration and the way it is indirectly taken into account can generate uncertainty.

The use of census-linked data can help get around internal migration issues: in complete census, people who moved internally can be directly identified. However,

[9] Non-varying variables over time can be self-reported differently from one census to the other: the year of birth as pointed out by Van Hook et al (2006) but also the country of birth and the nationality at birth (see Gobillon and Solignac, 2019).

[10] When repeated surveys follow individuals rather than dwellings, internal mobility is a major cause of lost to follow-up.

individual record linkage is strictly regulated. Indeed, the use of this approach in the US is still restricted to the first half of the 20th century. Moreover, ex-post linkage only based on family names, birth date and place generates a high rate of matching failures, even for natives (Abramitzky et al., 2014)[11]. It can help to indirectly assess characteristics of remigrants but do not lead to precise estimates about the magnitude of outmigration. Integrated systems of merging census already exist, like in France since 1968, offering a very high quality level of matching for a representative sample of the population. Moreover, as individual follow-up of mortality from vital records are included, attrition of foreign born from one complete census to the next one can be directly assimilated to remigration. Thus, robust estimates of outmigration can be calculated (Solignac, 2018).[12] The main drawback is that some foreign born do not stay long enough to be observed in a census. All those who arrive and leave during intercensal periods remain ignored. Moreover, as complete census tends to be abandoned in favor of surveys (like in France since 2004) or administrative data, the implementation of that strategy over the past few years has been put into question.

Administrative data from social security have also been used to identify remigration (Turra and Elo, 2008; Lubotsky, 2007). Their follow-up of individuals can offer a combination of a direct and an indirect approach of remigration: direct as individuals have to declare their place of residence, indirect as the systematic record of their contributions to social security or the benefits they receive from it may give evidence of their

[11] Alternative method: Abramitzky et al. (2012) linked Norwegian complete censuses and a full enumeration of Norwegian in the US in between.

[12] This type of strategy is also used in countries with population registers to take into account undeclared outmigration (Bijwaard et al., 2014; Larramona, 2013).

outmigration when these money transfers stop before they death. Compared to census, the coverage of these databases can be an issue. Another is that administrative process that lead one individual to have missing information for a few years may be disconnected from his actual presence or absence from the territory. But individuals have financial incentives to be included and in some cases to update information. In particular, the quality of information is generally improved upon retirement as automatic records are checked by individuals who are offered an opportunity to complete missing information and correct errors. Thus multiple counts of individuals whose employment spells have been recorded under different alias can be avoided. Moreover, thanks to a systematic recording of contributions or benefits received, these administrative data offer a cumulative stock of individuals who were at some point in the country, no matter whether they are still alive or still living in the country. In this article, we leverage such an exceptional dataset. The novelty of this study is that it provides a detailed overview of out-migration of foreign born over their entire adult life course. It gives us the opportunity to measure the total proportion of foreign born who out-migrate, irrespective of their date of entry or out migration, and without any constraints on the duration of stay. Using that framework, we can study how out migration varies with age and duration of stay. It can be done for foreign born from various countries of origin.

3) Method

This section describes our analysis data, the measures, and the statistical approach used to investigate out-migration among the foreign born.

Data and measures

We draw data from France's main pension fund, which is named Caisse Nationale d'Assurance Vieillesse (CNAV) in French. The CNAV organizes pensions for individuals who have ever worked as employees in the private sector. These data cover a large fraction of the elderly male population in France, as approximately 95% of all male pensioners in France have worked at some point in their career in the private sector and receive some or all their pension allowance from the CNAV. Also, previous studies based on the CNAV data have found mortality estimates close to those from the human mortality database and other official sources, indicating high national coverage (Guillot et al., 2019).[13] Our analysis relies on a probability sample prepared by the CNAV (sample sizes below). It includes foreign born males receiving a pension from the CNAV as of December 31st, 2008. For all sample pensioners, we have data covering the time window between the date of their first contribution to the CNAV pension system (i.e. first time they have worked as an employee of the private sector) and their date of death or December 31st, 2014 (whichever comes first).

Information about place of birth, present in the CNAV data, is used to identify the foreign born (i.e. all individuals who were not born in France). These foreign born, who have all worked in France at some point in their career, may be residing either in France or

[13] It is also worth noticing that the issue of undocumented immigrants is much less pervading in France than in the US: their proportion is estimated at between 6% and 10%, versus 25% in the United States (Héran, 2015). Moreover, they are not necessarily excluded from the dataset: only those who have remained undocumented during their entire working life in France are not included.

abroad by the time we observe them as pensioners in our sample. The data further provide a wealth of demographic information that helps us to follow pensioners' residential location. This information is available from January 1st, 2005 onward for pensioners who retired before this date and from the date of retirement, for those who retired between January of 2005 and December of 2008. Residence information at and after retirement is then directly provided in the dataset for the cohort of the foreign born retiring between 2005 and 2008. As for residence information during pensioners' active life, it can be reconstructed from the data on yearly contributions to the pension system and from data on the reception of social benefits such as unemployment compensation. In that case, we assume that the foreign born out-migrate at the point where they stop contributing to the pension system or stop receiving any social benefits. This assumption is consistent with prior research using US social security data (Lubotsky, 2007). However, it does have the potential drawback of inflating out-migration at retirement when the date of retirement coincides with the date of pensioners' last observed contribution to the pension system when retirement occurred before 2005. Hence, for these foreign born an out-migration peak at retirement might well be a product of our assumption. To overcome this shortcoming, we make use of the subsample of the foreign born retiring between 2005 and 2008, to estimate rates of out-migration before and at retirement. Note that while we are still assuming out-migration occurring at the date of the last contribution to the pension system among the foreign born who migrated before retirement, we are no longer doing so for those who moved at or after retirement. The date of out-migration from retirement onward is defined as the date of a change of residence from France to abroad.

The foreign born of the cohort retiring between 2005 and 2008 provide a sufficiently large sample size to implement disaggregated analysis by country of origin (N=46,709). But these pensioners are followed up until December 31st, 2014, offering a 6 to 10 year window of observation. This cannot adequately serve to capture all post-retirement out-migration. To obtain these rates, we then focus on a synthetic cohort consisting of all the foreign-born pensioners who were residing in France as of December 31st, 2008 (N=99,045). The date of out-migration among these foreign born is defined as the date of their first change of residence from France to abroad.[14]

It is important to highlight that the approach using the 2005-2008 cohort of retirees is implemented to estimate rates until 67 years, since most people retire between 60 and 65 years and follow-up is performed until 2014 only. For ages 70 and above, the synthetic cohort approach is used. To smooth the transition between these approaches, estimates for ages 68 and 69 are obtained with linear interpolation.

To capture out-migration rates, we need to know when the foreign born came to France, as they enter the risk set of experiencing out-migration only once they are in France. However, the date of immigration is not provided in the dataset. To circumvent this challenge, we assume that this "date of arrival" to France is the date of their first contribution to the CNAV system, which is provided in the data. Studies with US social security data have shown that this approximation to the date of immigration yields consistent findings and tends to be preferable to dates obtained from cross-sectional surveys, as the latter can be inaccurate due to circular migration (Borjas and Bratsberg,

[14] A close examination of the data indicates that the choice whether out-migration occurs at the first or last change of residence does not sensibly affect our results at these ages.

1996; Lubotsky, 2007). Yet, assessing the date of immigration in this way may lead to errors especially among those who came to France at young ages. For this reason and because we are interested in estimating out-migration rates among workers, we restrict the analysis to the experience of remigration in ages past 15 years (Constant and Massey, 2003). Age is derived from the information on the date of birth present in the dataset. Also, the fact that some studies have suggested decreased reliability in the CNAV data at old ages leads us to limit the analysis to the experience of migration in ages below 85 years (Caisse Nationale D'Assurance Vieillesse, 2009). Finally, we make use of a variable that captures duration since immigration. This variable is bottom coded at 5 years and top coded at 45 years to provide stable estimates.

Statistical approach

We model out-migration with a piece-wise exponential regression following a generic definition of an out-migration rate (μ_t) at age t as follows:

$$\mu_t = \frac{f(t)}{S(t)}$$

Where f(t) is the density function of the non-negative random variable denoting the age of out-migration and S(t) is the so-called survival function, representing the probability that a given individual has not yet experienced out-migration. We also explore the experience of migration as a function of years since immigration, thereby focusing on the duration of stay in France. Age and duration of stay are expressed in discrete years. For all rates, confidence intervals are computed using standard procedures in survival analysis (Kalbfleisch and Prentice, 2002; Klein et al., 2013). We estimate separately out-migration rates and

associated confidence intervals for the cohort sample and the synthetic cohort sample. From these rates, we derive consistent probabilities of out-migration using standard conversion formulas (Preston et al., 2000). Then, we estimate the survivorship function, describing the probability that the foreign born stay in France. Remember that rates and probabilities for ages 68 and 69 are obtained with linear interpolation to ensure a smooth transition between the two approaches. Because our sample consists of former workers who survived through retirement, there is no censoring before retirement. However, after retirement, pensioners can be censored either because they reach the end of the observation period (December 31st, 2014) or because they die while residing in France. Deaths occurring abroad, having no relevance for our rates of out-migration, have not been accounted for in the estimation procedures.

4) Results

Table 1 presents the sample composition by country of birth. Pensioners born in Algeria represent the single most important group; these include both immigrants from Algeria and French/European settlers who moved to France before or after the Algerian independence in 1962. Portugal, Morocco, Spain, Italy, and Tunisia are the next top countries of origin; together with Algeria these 6 countries accounting for over 80 percent of the foreign-born pensioners. Panel A reports the sample distribution for the cohort of pensioners retiring between 2005 and 2008, which is the data source for the analysis of out-migration before and at retirement. Transparent in the table is the fact that a relatively large share of the foreign born did not stay in France: approximately 35 percent have out-migrated. Spain stands out, as 64 percent of pensioners, who were born there and came to France, left. Foreign born from Portugal and Algeria are also very likely to out-migrate from

France, with their proportion residing abroad being 40 and 39 percent. The lowest proportion of the foreign born who left France are recorded among the Tunisian and Moroccan born. Panel B presents the sample description among foreign born pensioners who were residing in France as of January 1st, 2009. As mentioned in the data section, this sample serves to investigate post-retirement out-migration. The shares of the foreign born who migrate after retirement are relatively low compared to proportions found in Panel A: the overall proportion of out-migrants is lower than 5% for all six countries. Virtually, no Italian born out-migrate after retirement, with less than one percent among these foreign born leaving France. These sample descriptions indicate not only a large magnitude of out-migration, but also its variation over the life course. Overall, there is tremendous variation across countries of origin in the experience of leaving France. Although these sample descriptions highlight the magnitude of out-migration, the question about how age relates to out-migration remains unsettled.

Graphs 1a through 1g illustrate age-specific rates of out-migration by country of birth among the foreign born in France. Each country of origin is represented in a separate graph to provide clarity in the reading, but the scale is kept uniform across graphs. An examination of the graphs shows that the risks of out-migration tend to be high at young ages especially, when the foreign born are between 25 and 40 years old. Past these ages, the risks of out-migration drop substantially, then spike around the age 60, suggesting some increased likelihood of out-migration at retirement. Among pensioners born in Algeria, out-migration peaks in the mid-twenties, late thirties and at 60, with rates as high as 264, 261, 70 per ten thousand respectively. While the first two peaks indicate out-migration during the working ages, the last peak is illustrative of out-migration at

retirement. Among pensioners born in Portugal, there are also two pre-retirement out-migration peaks: one in the early thirties (208 per ten thousand), and another at 40 (208 per ten thousand). These pensioners born in Portugal experience a spike in their rate of out-migration at 60 followed by another one at 65 years of age, indicating two peaks at retirement. The Italian born pensioners face their highest risk of out-migrating in their mid-twenties, and a more modest peak at 60. Among the pensioners born in Spain, rates of out-migration are the highest compared to the foreign born of any other national origin, especially at young ages. The rate of out-migration is as high as 540 per ten thousand at 33. Rates of out-migration are comparatively lower among pensioners born in Morocco and Tunisia; but these rates tend to be higher at early ages. A clear message from these graphs is the fact that out-migration does not stop at retirement, but continues even at old ages, especially for those born in Northern Africa.

When we look at the overall shapes of the migration schedules, they vary greatly by origin country; yet, they display some regional similarities. For example, age-specific rates of out-migration of pensioners born in Algeria and Morocco are roughly a scaled version of one another. At the same time, the graphs of out-migration rates found among pensioners born in Italy are very similar to those of pensioners born in all other countries not otherwise specified (mainly consisting of Germany, Belgium, and Turkey). Also transparent in the graphs is the fact that pensioners from Europe (especially, Italy and Spain) tend to out-migrate earlier than their counterparts from any other country. With these various rates, we are able to estimate life-time risks of out-migration among the foreign born.

Graph 2 displays the reconstructed life-time probabilities of staying in France among the foreign born. These probabilities represent a summary that helps assess the

population level implications of the age-specific rates reported above. For most countries of origin, out-migration occurs mostly between 20 and 40 years of age; thereafter the probabilities of staying in France change little. However, for those born in Portugal out-migration is experienced through their active life-span and at retirement, producing a continuously downward trending graph. The spike of out-migration at retirement is the most noticeable among this group of the foreign born along with pensioners born in Spain and, to a lesser extent, Italy. The shape of the life-time probabilities of remaining in France hints at relatively short durations of stay in France, which we investigate next.

Graphs 3a through 3g show rates of out-migration by duration of stay and by country of origin among the foreign born in France. For most countries of origin, pensioners, who out-migrate, often do so within 10 to 15 years of their arrival in France. The largest peak in out-migration occurs around 15 years of stay in France. There is a steady decline in the rates of out-migration up to 35 years of presence in France. Cross-country differences appear in the shape of the duration-specific rates, as well as in their magnitude. Unlike most foreign born, pensioners born in Portugal experience a dip in out-migration at 13 years of stay in France. Together, all the results suggest that pensioners born in Europe arrived younger to France and left only after a short stay, while those born in Northern Africa arrived later in their adult life and stayed longer.

5) Discussion

Drawing on longitudinal data from France's largest pension fund with worldwide dynamic follow-up, we estimate schedules of out-migration among the foreign born in France by origin country. We first find high rates of out-migration, especially at young ages. Our results are consistent with prior findings mostly from the United States, where, depending

on the country of origin, lower and upper bounds to the rates of out-migration were estimated to be 20 and 70 percent, respectively (Jasso and Rosenzweig, 1982). The shapes of age-specific rates of out-migration that we found are further consistent with standard migration schedules (Castles, De Haas, and Miller 2014; Preston, Heuveline, and Guillot 2000; Rogers and Castro 1981), though with a delay in the first mode. This discrepancy stems understandably from the fact that our analysis begins at the age of the first covered work experience. Our results contribute to the existing literature by providing age-specific rates of out-migration for ages between 15 and 85 years by country of origin.

Also, the disaggregate analysis sheds light on country and regional differences in the schedules of out-migration. These differences, which are easily buried in aggregate analysis, appear both in the shape and the scale of the schedules of out-migration. Hence, aggregate analysis of out-migration without enough attention to countries of origin would not adequately reflect the experience of the foreign born of any national origin. Past research has found that cross-country differences in the propensities of out-migration are a function of update in immigrants' reliefs, costs to and benefits from out-migration. This might plausibly explain the wide differences we observe in the rates of out-migration across countries of origin.

Finally, we illustrate that most foreign born, who out-migrate, do so within a relatively short window of their arrival to France. These results support findings from past research that report early departure among the foreign born (Constant and Massey, 2003, Dustman and Gorlach, 2016). However, they extend past research beyond the first few years of arrival, thereby providing a life-time perspective to the analysis of out-migration.

This paper has a number of limitations. First, we use pension data to estimate out-migration. This implies that neither the pensioners who never claimed their pensions (due to mortality or other reasons) nor those who have worked in the informal sector during their entire lives have been excluded from our analysis. However, the bias induced by this exclusion seems minimal, since the CNAV data have proven to be externally reliable for several studies. For example, estimates of mortality rates derived from this dataset are close to those from official sources (Guillot et al., 2019). Second, the paper assumes that the date of immigration is the data of pensioners' first contribution to the CNAV system and further assumes that the date of pre-retirement out-migration is the date when pensioners stop contributing to the pension system. These assumptions are consistent with past research; and our focus on experiences of out-migration past age 15 reduces the potential bias stemming from the approximation to the date of arrival. To circumvent this shortcoming, one would ideally have used panel data where both these exact dates would have been provided for the foreign born in addition to all the other features of our dataset. However, to our knowledge, there are no such publicly available panel data, neither in the United States nor in France. Despite these limitations, the current paper improves our understanding of out-migration among the foreign born by estimating age- and duration-specific rates of out-migration across a representative sample of foreign-born workers by country of origin. It also shows the advantages of investigating out-migration in a lifetime perspective.

This paper has implications for future research on the foreign born. The presence of heterogeneity across sending countries implies that cross-sectional analysis of stock data on the foreign born should be extremely cautious about selectivity, particularly in analysis

focusing on prime working ages, when the intensity of out-migration is the highest. We end with the suggestion that understanding the selectivity characterizing various streams of out-migration is a promising direction for new research on out-migration.

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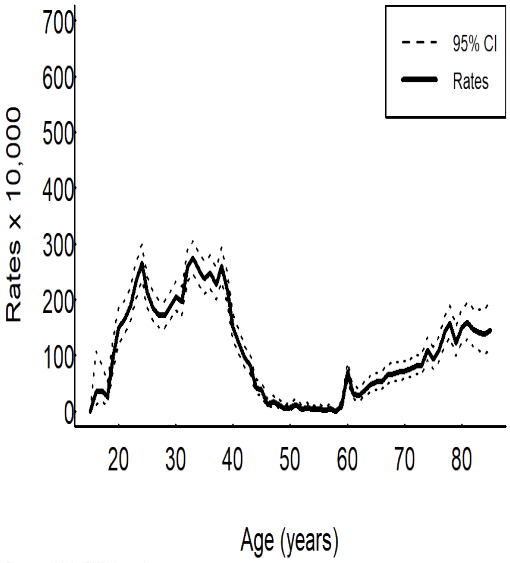
Table 1: Sample distribution by country of birth and migratory status, CNAV pensioners sample

Panel A: Foreign born from the cohort retiring between 2005-2008					
Country of Birth	**Whether have out-migrated by 2014**				
	No		**Yes**		**Total**
	N	**%**	**N**	**%**	**N**
Algeria	9,067	61.05	5,784	38.95	14,851
Portugal	4,425	59.72	2,985	40.28	7,410
Morocco	4,314	81.47	981	18.53	5,295
Spain	1,419	36.02	2,521	63.98	3,940
Italy	2,212	64.93	1,195	35.07	3,407
Tunisia	2,611	79.92	656	20.08	3,267
Other Foreign Countries	5,995	70.21	2,544	29.79	8,539
Total	**30,043**	**64.32**	**16,666**	**35.68**	**46,709**

Panel B: Foreign born residing in France as of 01/01/2009, ages<85					
Country of Birth	**Whether have out-migrated by 2014**				
	No		**Yes**		**Total**
	N	**%**	**N**	**%**	**N**
Algeria	32,845	95.08	1,698	4.92	34,543
Portugal	10,556	95.60	486	4.40	11,042
Morocco	10,956	95.24	547	4.76	11,503
Spain	6,490	96.56	231	3.44	6,721
Italy	11,177	99.29	80	0.71	11,257
Tunisia	8,050	96.48	294	3.52	8,344
Other Foreign Countries	15,292	97.81	343	2.19	15,635
Total	**95,366**	**96.29**	**3,679**	**3.71**	**99,045**

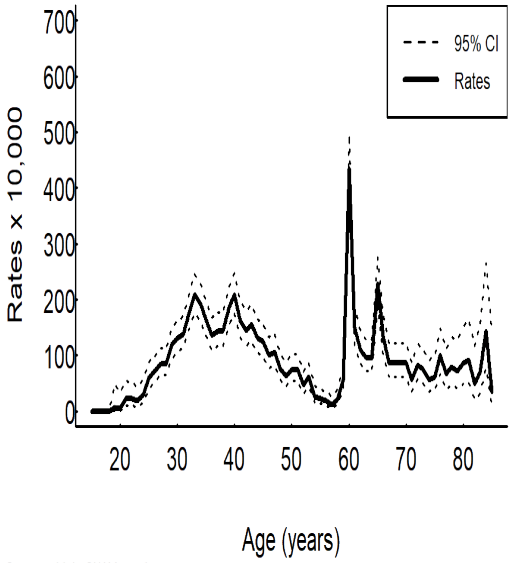
Source: Male CNAV pensioners

Figure 1a: Age-Specific Rates of Out-Migration Among Immigrants to France Born in Algeria



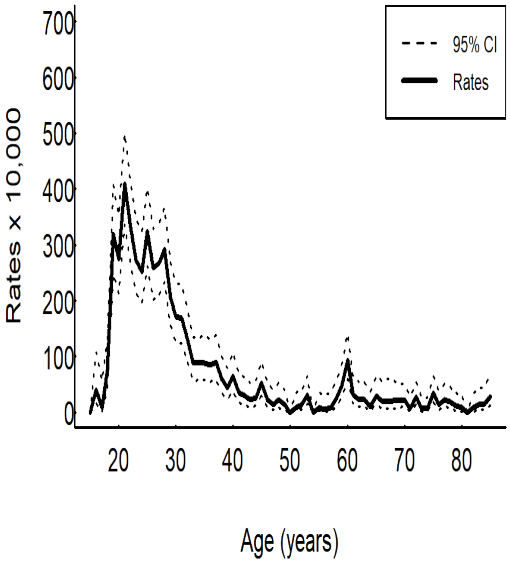
Sources: Male CNAV pensioners

Figure 1b: Age-Specific Rates of Out-Migration Among Immigrants to France Born in Portugal



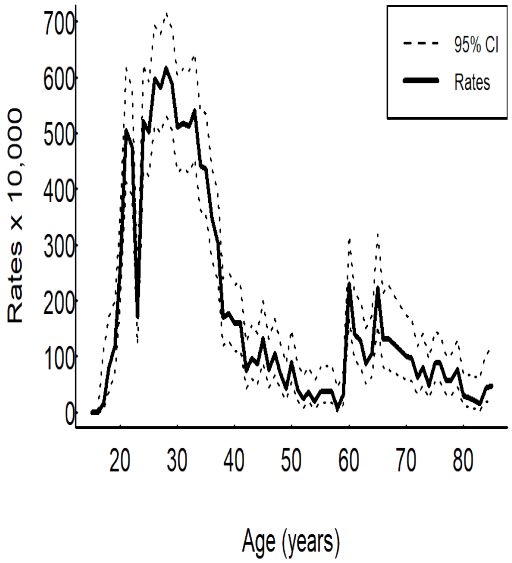
Sources: Male CNAV pensioners

Figure 1c: Age-Specific Rates of Out-Migration Among Immigrants to France Born in Italy



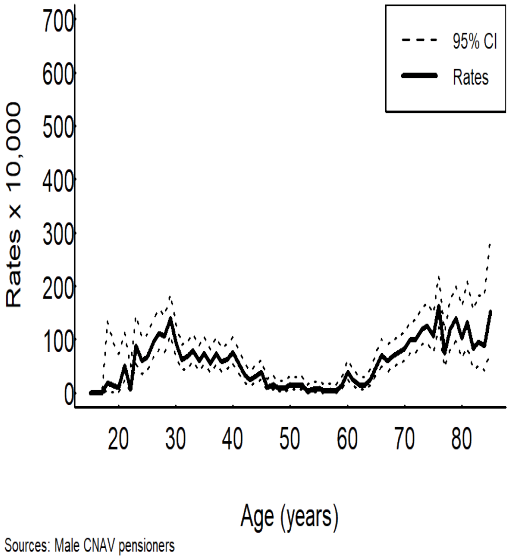
Sources: Male CNAV pensioners

Figure 1d: Age-Specific Rates of Out-Migration Among Immigrants to France Born in Spain



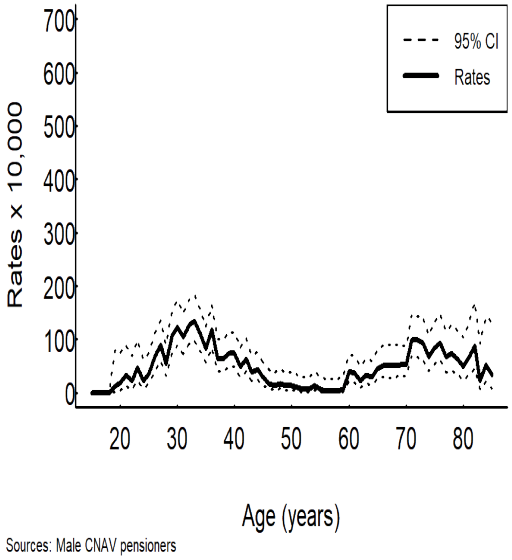
Sources: Male CNAV pensioners

Figure 1e: Age-Specific Rates of Out-Migration Among Immigrants to France Born in Morocco



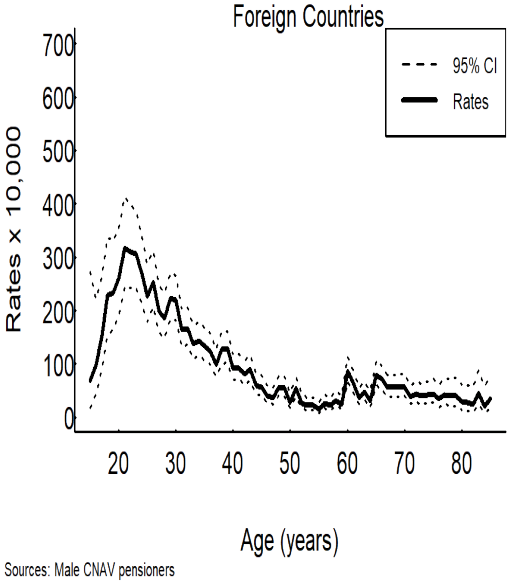
Sources: Male CNAV pensioners

Figure 1f: Age-Specific Rates of Out-Migration Among Immigrants to France Born in Tunisia



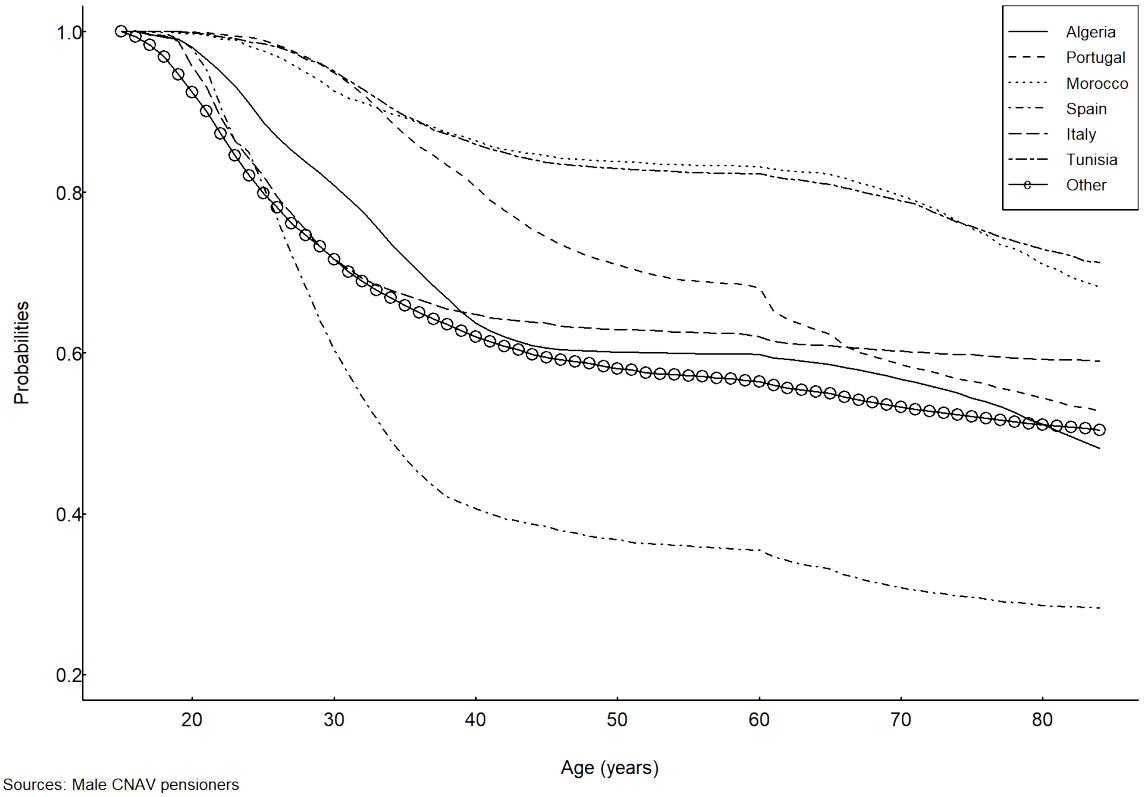
Sources: Male CNAV pensioners

Figure 1g: Age-Specific Rates of Out-Migration Among Immigrants to France Born in the Rest of Foreign Countries



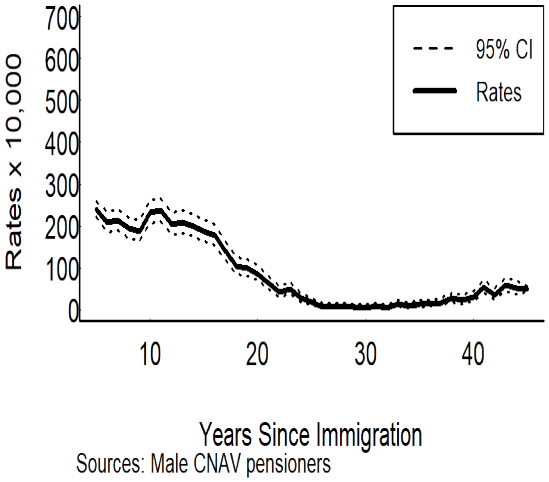
Sources: Male CNAV pensioners

Figure 2: Probability of Not Out-Migrating Among Immigrants to France by Country of Birth



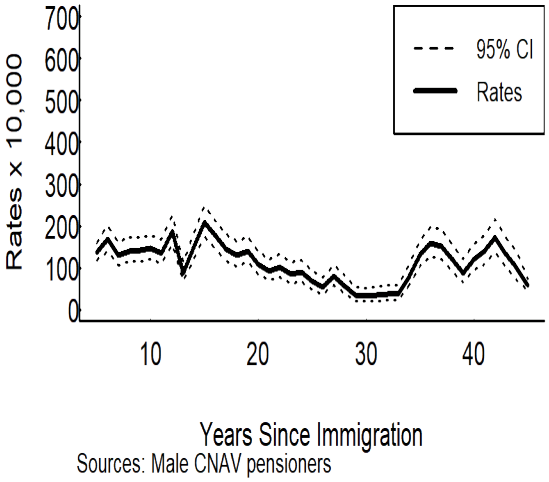
Sources: Male CNAV pensioners

Figure 3a: Rates of Out-Migration by Years Since Immigration Among Immigrants to France Born in Algeria



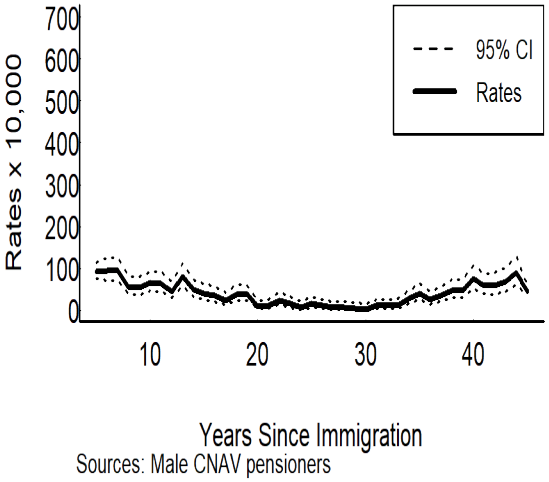
Sources: Male CNAV pensioners

Figure 3b: Rates of Out-Migration by Years Since Immigration Among Immigrants to France Born in Portugal



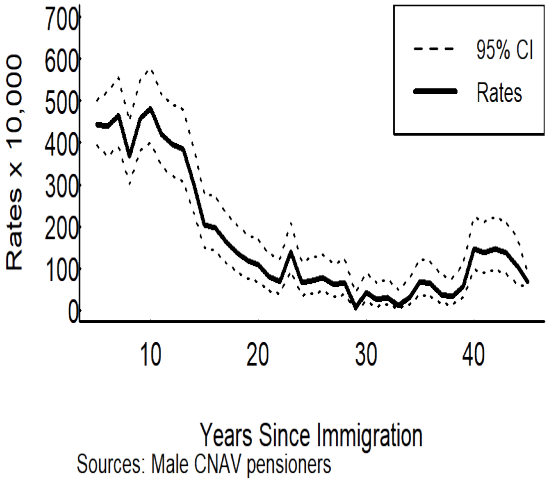
Sources: Male CNAV pensioners

Figure 3c: Rates of Out-Migration by Years Since Immigration Among Immigrants to France Born in Morocco



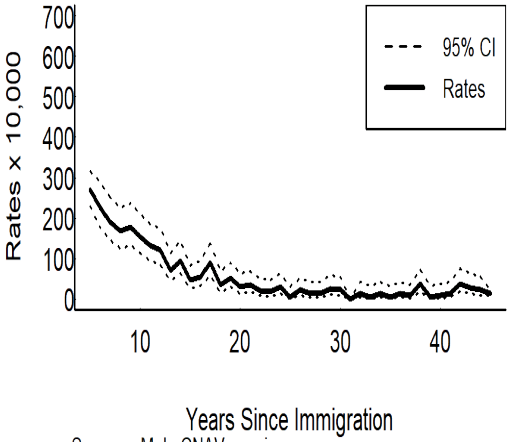
Sources: Male CNAV pensioners

Figure 3d: Rates of Out-Migration by Years Since Immigration Among Immigrants to France Born in Spain



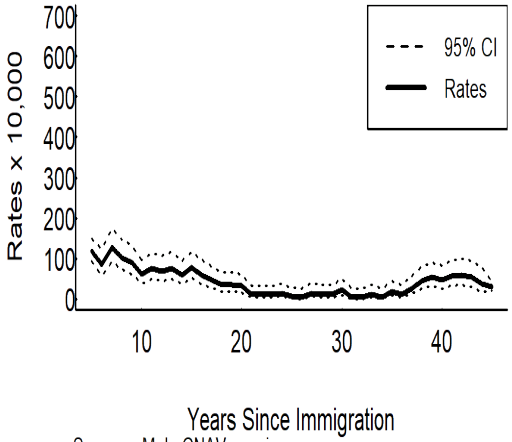
Sources: Male CNAV pensioners

Figure 3e: Rates of Out-Migration by Years Since Immigration Among Immigrants to France Born in Italy



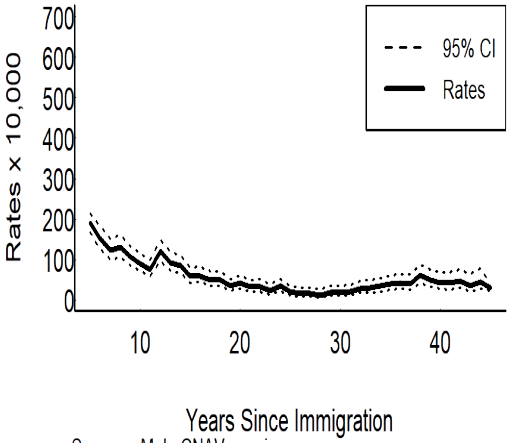
Sources: Male CNAV pensioners

Figure 3f: Rates of Out-Migration by Years Since Immigration Among Immigrants to France Born in Tunisia



Sources: Male CNAV pensioners

Figure 3g: Rates of Out-Migration by Years Since Immigration Among Immigrants to France Born in the Rest of Foreign Countries



Sources: Male CNAV pensioners