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« RESIDENTIAL MOBILITY AND LIFE CYCLE: IDENTIFYING THE ROLE OF LOCAL TAXES »

Auteurs

Asmae AQZZOUZ, Nathalie PICARD

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Bureau d'Économie Théorique et Appliquée BETA

www.beta-economics.fr

@beta_economics

Contact :
jaoulgrammare@beta-cnrs.unistra.fr

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RESIDENTIAL MOBILITY AND LIFE CYCLE: IDENTIFYING THE ROLE OF LOCAL TAXES

Asmae AQZZOUZ
BETA- Université de Strasbourg
asmae.aqzzouz@unistra.fr

Nathalie PICARD
BETA – Université de Strasbourg
picardn@unistra.fr

Abstract

This study examines the influence of local taxes on household migration behavior between French municipalities ("communes"). We group households into five tenure status categories and four categories of household head age. Our findings support Tiebout "voting with feet" theory, especially among young flat renters in the private sector and flat owners. A surprising result is related to the introduction of the municipality size in the regression which dramatically affects the coefficient measuring the effect of local tax rates on migration probability. This suggests that a large part of the "Tiebout effect" usually found in the literature is an artefact caused by the spurious correlation between municipality size and local tax rates.

Keywords

Residential mobility, local taxes, local public expenditures, heterogeneity, local amenities, life cycle.

JEL Classification:H71, H72, R23

1. INTRODUCTION

Municipalities often engage in fiscal competition to retain households or attract new ones. When local tax rates increase in a municipality, households may choose to stay anyway, for several reasons. One key reason, highlighted by Tiebout (1956), is that households value the public services and local amenities that are financed by local taxes. Another factor influencing the decision to stay is the cost associated with moving to a different municipality. Relocation induces both moving costs and transaction costs (de Palma and Lefevre, 1985; Ben-Akiva and de Palma, 1986). On the other hand, households also consider potential gains from moving, either to a commune where local taxes are lower, or to a commune with better public services or local amenities.

Tiebout (1956) suggests that migration occurs either when household preferences or needs change, or when changes in municipal tax rates disrupt the equilibrium. In this paper, we analyze the combined effect of these two groups of factors influencing household migration, and try to disentangle the effect of local taxes from the one of public services or local amenities. On the one hand, local taxes are typically used to invest in, or maintain local public amenities, implying that some houses are willing to afford a higher local tax rate in order to enjoy better-quality local amenities. On the other hand, household preferences and moving cost strongly

depend on the individual characteristics of household members (e.g. age or education of household head). In addition, preferences evolve over the life cycle.

Our study is original in several dimensions. First, we analyze migration at a very detailed geographical level, comparing 29,634 municipalities, whereas empirical literature usually considers either migration between large geographical units such as countries, regions or departments, or short distance migration, between municipalities in a single region. Second, it is the first study to investigate in detail the impact of local tax rates on migration in France.

To test the "voting with feet" theory of Tiebout (1956), we combine several data sources. Household information is built from census data, focusing on migration between 2012 and 2017. We selected 13.18 million households with a head over 15 in 2017, split into four age groups: 15-29, 30-44, 45-59, and over 60 (in 2017). We consider price indices at the commune level, separately for flats and for houses, separately for rents and transactions. Finally, we gather information available online for tax and local expenditures for the 29,634 French municipalities ("communes").

We focus on inter-municipality migration. In our sample, 947,655 households relocated to a different municipality between 2012 and 2017. This represents a migration rate of 7.18 %. The 12.23 million remaining households (92.82%) either moved within the same commune, or did not move at all.

In a nutshell, our empirical findings stress the heterogeneity of migration behavior, which is concentrated at the early stages of the life cycle. Tenants in the private sector are more mobile than both owners and tenants in social housing sector. Migration is also correlated with gender, education, occupation and nationality of household head. Interestingly enough, household heterogeneity in migration patterns becomes negligible towards the end of the life cycle.

Our empirical findings support the Tiebout (1956) "voting with feet" theory in the sample of households living in a flat, irrespectively of their age or tenure status: these households are willing to pay a larger local tax rate because it is typically associated with better local public expenditures. Furthermore, the (positive) effect of local tax rate on migration probability is reduced when the amount of public investments is controlled for in the regression.

The subsequent results are more original. They highlight the fact that Tiebout effect is strongly biased by spurious correlation. Some non-public local amenities or characteristics enjoyed by households, with no clear causal relation to local tax rate, happen to be strongly correlated with local tax rates. As a consequence, controlling for such amenities significantly reduces the effect of local tax on migration. Although these results make sense, they were not yet documented in the literature, to the best of our knowledge.

An even more surprising result is provided by the size of the commune (measured by the log of number of inhabitants). The introduction of this covariate in the regression has a dramatic effect on the coefficient measuring the effect of local tax rate on migration, which becomes non-significant in the social housing sector, and even negative for the older households renting a flat in the private sector. This suggests that a large part of the “Tiebout effect” usually found in the literature is an artefact caused by spurious correlation between commune size and local tax rate. Note that the effect of commune size is consistent with the fact that many private amenities such as restaurants, bars (appreciated by young households) or hospitals (appreciated by older households), are typically located in large communes.

The results are totally different for households living in a house, for which the sign of the “Tiebout effect” is not consistent with what is usually found in the literature. For households renting a house, the effect of local taxes on migration is always negative, whatever the age

category and the covariates considered. This can be explained by two factors. First, living in a house is typically more expensive than living in a flat, which makes households living in a house more sensitive to budget constraints than households living in a flat. Second, a house offers inside amenities such as a garden or more space or more comfort inside, so that households living in a house are less sensitive to local (green, recreational) amenities than households living in a flat.

Finally, for households owning a house, whatever the age group and the other covariates considered, the "Tiebout effect" is negative when household size is not controlled, but positive when it is controlled for. This may reflect the fact that only very rich households can afford a house in a large commune, whereas intermediate-income households are more constrained financially, and have to trade-off between housing expenditures and enjoying local amenities.

Our paper is organized as follows: In Section 2, we provide a concise literature review that explores the impact of local taxes on household migration and establishes the relationship between individual characteristics, local amenities, and migration decisions. Section 3 is devoted to the presentation of the data used in our analysis, along with descriptive statistics. In Section 4, we discuss the results obtained from several binary models explaining household migration. The models are estimated separately for different age categories, tenure status and dwelling types, allowing for a comprehensive examination of the factors influencing migration patterns over the life cycle. Finally, Section 5 concludes our empirical findings.

2. LITERATURE REVIEW

The influence of local taxes on the migration decision

The idea that local tax rates can influence household migration was developed in Tiebout's theory in 1956. It states that, in a competitive environment, local governments offer varying tax rates and local public expenditure programs. As a result, mobile households tend to migrate to municipalities that align with their needs and preferences in terms of local tax rates and local public expenditure programs. In an efficient resource allocation and equilibrium scenario, no household can improve their well-being by relocating to another municipality. An equilibrium can be reached if local taxes are used to finance local public expenditures, as suggested by Hansen and Kessler in 2001. The adjustment of local tax rates and local public expenditure programs serves as the driving force behind households' movement across municipalities, as originally outlined by Tiebout in 1956.

Janez et al. (2016) suggest that migration typically happens in two cases. First, when household preferences and needs change, and second, when the equilibrium is disturbed by alterations in municipal tax rates. In this context, an increase in the tax rate of one municipality leads to households moving across municipalities, as noted by Hoyt (1993). According to Janez et al. (2016), if all municipalities increase their tax rates by the same percentage, households are less likely to relocate. However, when only one municipality alters its local tax rate, households start to move between municipalities, since mobile taxpayers seek to reduce their income tax burden by changing their tax residence, as explained by Agrawal and Foremny (2019). Consequently, tax competition can be intensified (Wildasin, 2006; Aqzzouz and Dimou, 2022).

Frey (1981) conducted a study in the Swiss context, examining the impact of local tax rates on household migration. His findings reveal a lack of significant effect of local tax rates on migration. Similarly, Feld (2000) conducted a similar analysis on household migration among Swiss cantons and reached the same conclusion as Frey (1981) – local tax rates do not

significantly influence the decision to migrate. However, Liebig et al. (2007) obtained contrasting results on the same case. They found that households tend to move to municipalities with high local tax rates if local tax rates are associated with high local public expenditures. According to their research, if municipalities with low tax rates offer a lower quality of life compared to those with high tax rates, some households prefer to migrate to municipalities with a high quality of life. This suggests a positive correlation between mobility and difference in local tax rates.

Janez et al. (2016) argue that one of the key factors influencing household migration between municipalities is local property taxes. Their study focuses on analyzing the impact of property taxation on migration flows to the municipality of Ljubljana, the capital of Slovenia, in 2011. Their results indicate that if the property tax rate in the Ljubljana municipality were to increase by 0.15% and if this increase were used to boost local tax revenue, then the municipality would become more attractive for migration flows. The authors emphasize that municipalities can shape the development of their territories and future demographic dynamics by using local tax policies. Through the management of revenues, municipalities can provide local public goods and services and contribute to spatial development, as highlighted by Pichler, Milanovic et al. (2008).

In the analysis of migration, several studies consider the role of local public expenditures. Friedman (1981) is one of the pioneering authors who examined the impact of local public services on household migration. His research indicates that the influence of local public services on migration is limited. Quigley (1985) studies the Pittsburgh metropolitan area, considering school expenditures per student and municipal expenditures per household. He finds that migration probability to a municipality with high levels of local public expenditures is highly significant. Nechyba and Strauss (1998) demonstrate the relevance of school expenditures as an attractive factor in New Jersey. Municipalities with high levels of school expenditures are significantly more attractive than those with low school expenditures. Bayoh et al. (2006) further confirm these findings, focusing on the effect of per capita education expenditures on migration decisions within the state of Ohio, United States.

Individual characteristics, local amenities and migration decision

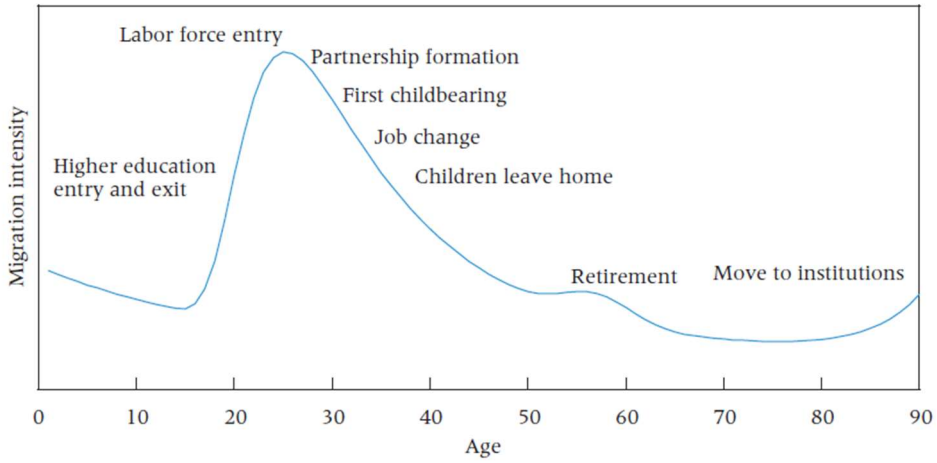
Household migration is influenced by various factors, as stressed in various studies. Positive factors such as market opportunities, local amenities, and employment opportunities have been identified as influential in migration decisions (Rossi, 1955; Leslie and Richardson, 1961; Strassmann, 1991; Hooimeijer and Oskamp, 1996; Strassmann, 2001; Winstanley, Thorns, and Perkins, 2002; de Palma et al., 2005). Conversely, negative social issues have also been found to contribute to residential mobility. For instance, separation or divorce can lead to household relocation (De Jong and Graefe, 2008). Additionally, a slight decline in the housing market price can influence migration decisions (Ferreira, Gyourko, and Tracy, 2010), and personal dissatisfaction has been identified as a factor in residential mobility (Nowok, Van Ham, Findlay, and Gayle, 2013).

Graves and Knapp (1988) suggest that analyzing household migration requires considering individual characteristics such as age, education level, family status, and the amenities available in both the departure and arrival locations. These amenities can include cultural amenities, the quality of the natural and social environment, the provision of local public goods, and the level of local tax rates. According to Prashker et al. (2008), there are four groups of factors that influence household migration. First, residential unit characteristics, such as the size and type of the dwelling, and the age of the building, can play a role. Second, local

characteristics, including the quality of living in a particular environment, or the level of security, traffic conditions, noise level, and air pollution, are also influential. The third group relates to accessibility characteristics, such as the proximity and accessibility to job offices or employment opportunities. Finally, individual characteristics, such as age, marital status, and presence of children, can influence migration decisions.

Castles and Miller (2009) explore the influence of individual characteristics on household migration. They highlight the significant role of age in residential mobility studies. Analyzing the connection between residential mobility and the life cycle of households, Abraham and Hunt (1997) as well as Clark and Huang (2003) find that young people in their twenties and thirties are the most mobile. Figure 1 depicts the age profile of migrants in relation to the life course. It suggests that young people migrate to improve their education or to secure suitable employment opportunities. However, migration probability starts to decrease around the age of 27 or 28, especially when they find stable employment, and it further declines with the arrival of their first children (Bernard et al., 2014). This indicates that as households settle into their careers and start building their families, their propensity for migration decreases.

Figure 1: Life-course transitions and the age profile of internal migration.



Source: Bernard, Bell and Charles-Edwards (2014). *Population and Development Review*, *40*(2), 213-239.

Several studies have examined the relationship between migrant age and various factors such as education level, demographic structure, and economic conditions. Warnes (1992a) links migrant age to the level of education, while Milme (1993) connects it to household demographic structure. Pandit (1997a) explores the association between migrant age and the economic situation. De Jong, Graefe, and Pierre (2005) argue that family status plays a crucial role in migration decisions since the decision-making process occurs at the household level. They suggest that singles are more likely to move than married. Furthermore, the probability of moving tends to decrease as household size increases, as highlighted by Josnin and Robert (2009).

Gobillon and Wolf (2011) examine the correlation between the type of accommodation and household migration. Their findings suggest that homeowners are less likely to move than renters in the private sector. Homeowners' migration is constrained by the costs associated with selling and purchasing a dwelling, whereas renters are influenced by variations in rental prices

(Sinai and Souleles, 2005). de Palma and Lefevre (1985), as well as Ben-Akiva and de Palma (1986) argue that transaction costs and moving costs could influence migration decision and location choices since they increase the duration of stay at one location. When the cost of moving to a new location is high, and the associated transaction costs are high, households tend to have longer durations of stay in their current accommodation. On the other hand, renters, who typically face lower transaction costs, have high probability to migrate as they have relatively lower barriers and expenses when it comes to changing their place of residence (de Palma et al., 2014).

Various studies, including Bartel (1979), Clark and Huang (2003), Li and Wu (2004), Prillwitz and Kennan and Walker (2010), examine the influence of education level on household migration decisions. These studies consistently find that education significantly increases migration probability. By contrast, households with low levels of education tend to have low expectations of the benefits of migration (Whisler et al., 2008; Grogger and Hanson, 2011).

Several studies have explored the impact of local amenities on household migration decisions. Wasmer and Zenou (2000), Feijten (2005), and Inoa et al. (2015) emphasize the influence of the local labor market. They highlight that households are more likely to migrate if the destination location offers more favorable employment conditions, such as higher salaries and better career prospects. Regarding local amenities beyond the labor market, de Palma et al. (2005) demonstrate that some factors, such as the number of metro stations in a municipality, increase migration probability. However, the presence of a large number of railway stations may decrease the likelihood of migration because of the negative externalities associated with rail transport in the close vicinity. Brueckner et al. (1999) suggest that the impact of local amenities on migration and location choice depends on income levels: wealthier households are more likely to reside in municipalities with higher levels of local amenities.

In this study, our objective is to analyze Tiebout' theory (1956), which argues that households are attracted to municipalities with high local tax rates because these rates are often associated with high levels of local public expenditures. By exploring this theory, we aim to gain insights into the relationship between migration patterns and the interplay between local tax rates and public expenditures. To achieve our objective, we take into account individual characteristics of households, such as age, education level, and family status, as these factors can influence migration decisions. Furthermore, we investigate the differences in local amenities and local tax rates between origin and destination municipalities. Doing so, we aim to ascertain to what extent the positive correlation between migration probability and local tax rate differences is driven by the role of high tax rates in financing local public expenditures, thus providing access to improved local amenities. Alternatively, we explore the possibility that the observed positive association may be biased by some spurious correlation with variables such as private local amenities, which are not financed by local tax rates. Our aim is to disentangle the effects of local tax rates, local public expenditures (potentially financed by local taxes) and other local amenities which are not financed by local taxes.

3. DATA AND DESCRIPTIVE STATISTICS

The main dataset used in this paper comes from the 2018 Population Census released by the French National Institute of Statistics and Economic Studies (INSEE). Specifically, using the MIGCOM file, we analyze the residential mobility of 13.18 million households and

their respective locations in 2012 and 2017. All information regarding individual characteristics used here pertains to the household head.

We use information provided for 29,634 French municipalities (communes). Two distinct types of measurable flows can be identified: inter-municipality flows and intra-municipality flows. Inter-municipality flows occur when a household migrates between two different municipalities, while intra-municipality flows refer to a movement within the same municipality. Here, we focus on inter-municipality flows. Specifically, we explain household decision to move out of the original municipality without leaving the country.

The second dataset used includes variables related to local amenities and local tax rates, which provide insights into the average well-being in each municipality. Table 1 presents descriptive statistics of these variables in our sample of municipalities. Population size counts the number of inhabitants in each municipality in 2017, and serves as an indicator of its urbanization level. Data on population size was provided by INSEE. The level of local public investment per capita[1] measures the financial resources allocated by municipalities to public infrastructures, services, and development projects. It reflects the extent of investment by the local government to enhance the quality of life and meet the needs of the municipality (Oates, 1969). Local public investment data were obtained from the French General Direction of Public Finance (DGFiP). The unemployment rate is an important indicator of the health of the local labor market within a municipality. The median income of households is a marker of the wealth within the local population. Data on both last variables comes from INSEE dataset.

We computed two property price indices, namely the flat price index and the house price index, using the Notaries' database. These indices provide a relative measure of the local price level. Each index represents the log of the price per square meter of a representative dwelling (2 rooms, no garage, no cellar, no balcony or terrace). Property prices can also serve as a proxy for unmeasured municipality amenities (Liebig et al., 2007). In addition, we included two similar indices related to renting prices: the flat renting price index and the house renting price index. Renting price indices data comes from CESAER[2]. We also consider local fiscal variables, namely the property tax rate and the housing tax rate, obtained from the French General Direction of Local Authorities (DGCL).Initially, the MIGCOM database contained information on 34,900 municipalities in France. The sample was slightly reduced to 34,851 because of missing information on population size, unemployment rate, local public expenditures per capita, housing tax rate, or property tax rate. Missing information on median household income further reduced the number of municipalities to 31,390. Missing information on flat or house price index further decreased to 29,634 municipalities. Data on flat and house price indices was not available for a significant number of municipalities, mainly located in Alsace. This missing information in the Notaries database is well documented (Cerema) We

[1] To assess the level of local public expenditure in a municipality, we use the local public investment variable as a proxy. Local public expenditure can be divided into two categories: short-term and long-term. Short-term local public expenditure refers to the day-to-day spending required to ensure the smooth operation of local public services. This includes expenses related to maintaining and repairing infrastructure, providing essential services like street lighting, public transportation, parks, and gardens, as well as covering the salaries and wages of municipal employees. On the other hand, long-term local public expenditure involves investments made by local authorities with a focus on improving infrastructure and developing public services over an extended period. These investments aim to enhance the quality of life and long-term sustainability of the municipality (Sonstelie and Portney, 1978). By considering the local public investment variable, we can gain insights into the overall level of local public expenditure in a municipality. This variable provides an indication of the resources allocated to both short-term operational expenses and long-term development initiatives.

[2] UMR1041 CESAER (Agrosup Dijon – INRAE).

are left with a final sample of 29,634 municipalities with complete information on population size, unemployment rate, local public expenditures, housing tax rate, property tax rate, median household income, flat prices, house prices, flat renting price and house renting price was available.

Table 1: Descriptive statistics: local characteristics of municipalities in 2017

	OBS	Mean	Std Dev	Min	Max
Population size	29,634	2,016.19	8,744.85	80	479,55
Unemployment rate	29,634	10.82	4.43	0	41.67
Local public investment per capita	29,634	419.83	664.17	0	61,785.71
Property tax rate	29,634	15.09	6.67	0	56.38
Housing tax rates	29,634	12.55	4.89	0	43.17
Median household income	29,634	20,352.72	2,838.57	9958.3	45,902.40
Flat price index	29,634	7.21	0.36	5.39	9.29
House price index	29,634	6.66	0.35	5.91	9.24
Flat renting price index	29,634	5.78	1.40	2.97	30.23
House renting price index	29,634	7.13	1.76	3.64	25.67

Source: INSEE, DGCL, DGFiP, DV3F, CESAER, Authors calculations

In the dataset, 947,655 households, accounting for 7.37% of the households living in our remaining 29,634 municipalities in 2017, relocated from their original municipality. Conversely, 12.23 million households, representing 92.63% of the total listed, chose not to migrate between municipalities. Appendix Table 3 provides an overview of the migration patterns of households based on the age group of the household heads. Recognizing that the probability of migration can vary throughout the lifecycle, we grouped households into four age groups: 15-29, 30-44, 45-59, and over 60. Among households that migrated to a different municipality, 15.26% were headed by individuals aged between 15 and 29, 8.41% were headed by individuals aged between 30 and 44, 3.95% were headed by individuals aged between 45 and 59, and 2.57% were headed by individuals over the age of 60. It is evident that households with heads aged between 15 and 29 are more likely to engage in migration compared to the other age groups.

4. DETERMINANTS OF MIGRATION OVER THE LIFE CYCLE

Our empirical study starts by estimating the effect of individual characteristics on household migration between the 29,634 French municipalities of our sample. Following Moretti and Wilson (2017) and Agrawal and Foremny (2019), let D denotes the Departure municipality and A the Arrival municipality. Household *i* chooses the location that maximizes her utility U_i among a finite set of mutually exclusive destinations. Household *i* moves from departure municipality *D* to arrival municipality *A* if she can reach a higher utility level in *A* than at any other alternative municipality *A'*, including departure municipality D (Herger & McCorriston, 2013). If household *i* stays at her same municipality *D*, then her utility in *D* is larger than her utility in any other destination A (taking into account the costs to be paid in case of moving). Let U_{iDA} denote the utility of *i* moving from *D* to *A* and U_{iDD} her utility is she stays in *D*:

$$M_{iDA} = \begin{cases} 1 \; if \; U_{iDA} > U_{iDA} \quad \forall \, A' \neq A \\ 0 \; if \; U_{iDD} \geq U_{iDA} \, \forall \, A \neq D \end{cases} \quad (1)$$

Movers are household for which M_{iDA} = 1 and stayers are household for which M_{iDA} = 0. Then,

$$P\,(M_{iDA} = 1) = \Phi\,(\alpha_0 + \alpha_1 X_i + \alpha_2 (Z_A - Z_D) + \alpha_3 (TAX_A - TAX_D)) \quad (2)$$

where, $\alpha_0 + \alpha_1 X_i + \alpha_2 (Z_A - Z_D) + \alpha_3 (TAX_A - TAX_D)$ is the deterministic part of $(U_{iDA} - U_{iDD})$. X_i is a vector of individual characteristics, Z_D and Z_A are vectors of local amenities at Departure and Arrival, respectively and TAX_A and TAX_D are vectors of local tax rates at Departure and Arrival.

We split our sample of households into four distinct age categories for household head in 2017: 15-29, 30-44, 45-59, and over 60. In each sample, we fit a probit model to estimate the effect of individual characteristics on household migration probability, and compute migration probability as a function of age and other individual characteristics. Appendix Table 2 shows the coefficients measuring the effect of household heads characteristics on migration.

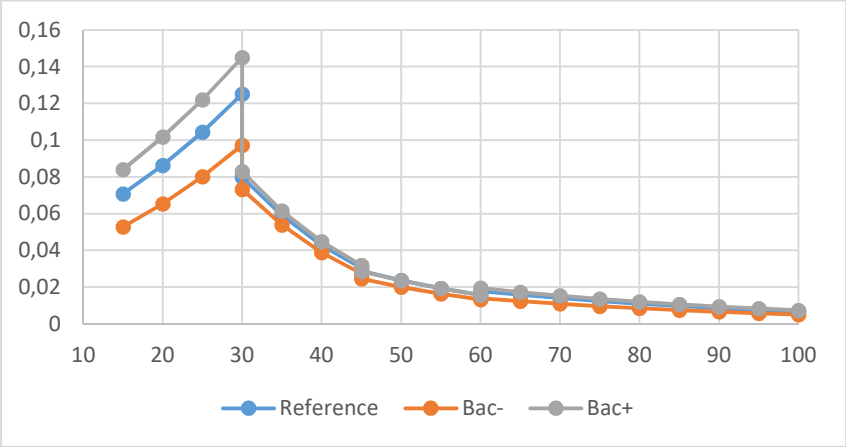
The estimation results are displayed in Figures 2 to 7. Each figure represents the combined effect of age and a specific characteristic on migration probability, for a representative individual (tenure status: owner; family status: married or living together; Education: Baccalaureate; gender: man; nationality: French; profession: Employee. Each curve illustrates the evolution of migration probability by age for a given category of the individual characteristic of the household head considered.

Several conclusions can be drawn from our estimations. Household migration probability is maximal when the head is 29. It increases fast from 15 to 29, then decreases slower and slower from 30 to over 60, with a few (not significant) small jumps for some categories. This finding aligns with the life cycle perspective of residential mobility, as discussed in Figure 1 of the literature review. Furthermore, the positive relationship between age and migration within the younger cohort is consistent with Becker (1964) prediction. Overall, this result supports the notion that age plays a significant role in residential mobility, with the highest migration probabilities observed among younger household heads. Our empirical findings thus confirm existing theories regarding the influence of age on migration behavior and fine-tune the understanding of the dynamics migration patterns over life cycle.

Note that the shape of age effect for the different categories of household was not imposed to be similar. Furthermore, the (quasi)continuity of the effect of age on migration probability at 30, 45 or 60 was not imposed a priori, but is an empirical result obtained in our sample.

Figure 2 and Appendix Table 4 illustrate the effect of household head education and age on migration probability. In Figure 2, all other characteristics are fixed to their reference category. Migration probability increases with education between 15 and 29. This suggests that education plays a significant role in motivating households to seek opportunities and better prospects in other locations. Higher levels of education often correspond to increased economic opportunities, access to better job markets, and a willingness to explore new environments. By contrast, lower levels of education may limit the prospects for individuals to pursue migration as a means of improving their circumstances. After 30, the effect of education on migration is smaller but still positive and significant. Controlling for education and other characteristics, migration probability increases from 15 to 29, and decreases regularly until the end of life cycle. Note that the continuity of the curves on Figure 2 on the range 30-100 was not imposed, but is rather an empirical result.

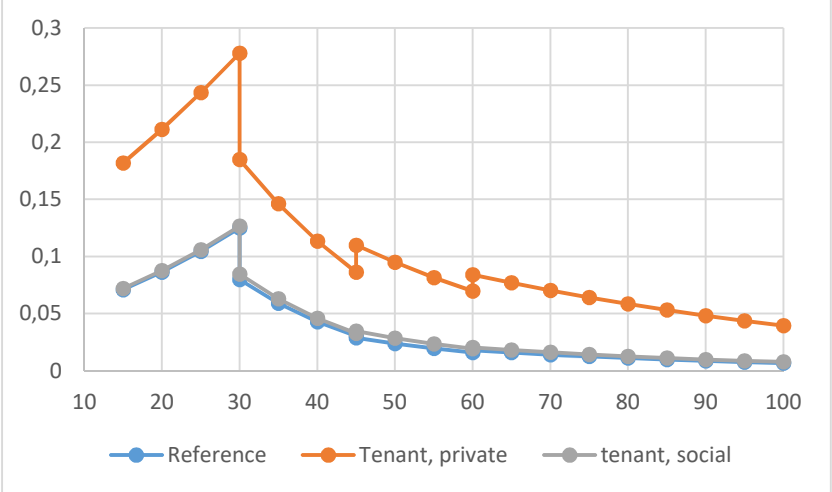
Figure 2: Migration probability by age and education



Source: INSEE, MIGCOM data, Authors estimations

Figure 3 and Appendix Table 5 illustrate the effect of tenure status and household head age on migration probability. The difference between migration probabilities of tenants in the social sector and owners (reference category) is very small, and hardly significant. Migration probability is by far larger for tenants in the private sector, throughout the entire life cycle. This suggests that households renting in the private sector are more inclined to seek opportunities outside their original municipality, all over the life cycle. By contrast, tenants in the social housing sector face additional challenges when considering relocation. Given severe short supply in social housing sector in most municipalities, it is very difficult to find a dwelling in the social housing sector in the destination municipality. Owners bear higher moving costs (including transaction costs).

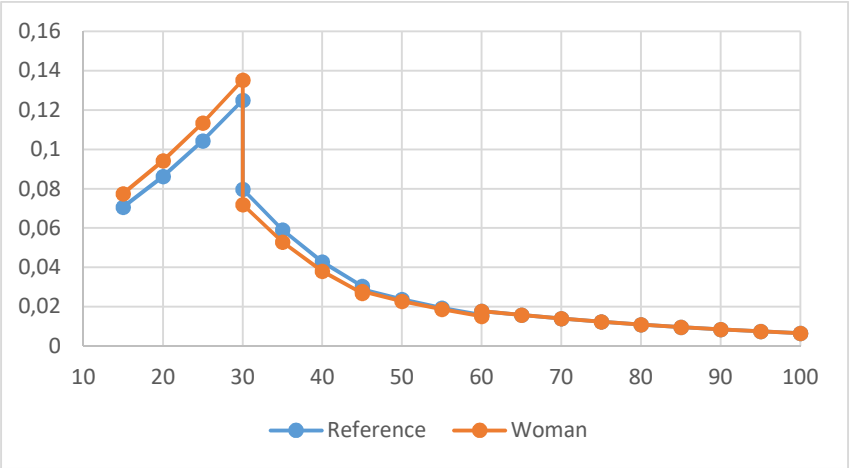
Figure 3: Migration probability by age and tenure status



Source: INSEE, MIGCOM data, Authors estimations

Figure 4 and Appendix Table 6 illustrate the effect of gender and household head age on migration probability. The difference in migration probabilities between households headed by women and those headed by men (the reference category) is very small and significant between 15 and 59, and it is not significant at all for older. Controlling for gender and other characteristics, migration probability increases from 15 to 29, and decreases regularly until the end of life cycle.

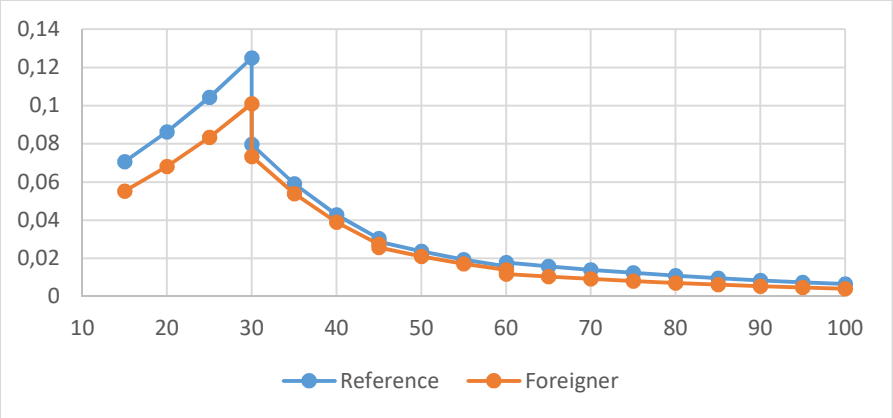
Figure 4: Migration probability by age and gender



Source: INSEE, MIGCOM data, Authors estimations

Figure 5 and Appendix Table 7 illustrate the effect of nationality and household head age on migration probability. Between 15 and 29, migration probability increases when household heads are french (the reference category). One possible reason for this difference could be linked to the socio-economic conditions of foreigners, who may frequently experience greater social and economic vulnerability (Schaffar et al., 2019). After 30, the effect of nationality on migration is smaller but still significant and the difference in migration probabilities between both household types is small. Controlling for nationality and other characteristics, migration probability increases from 15 to 29, and decreases regularly until the end of life cycle.

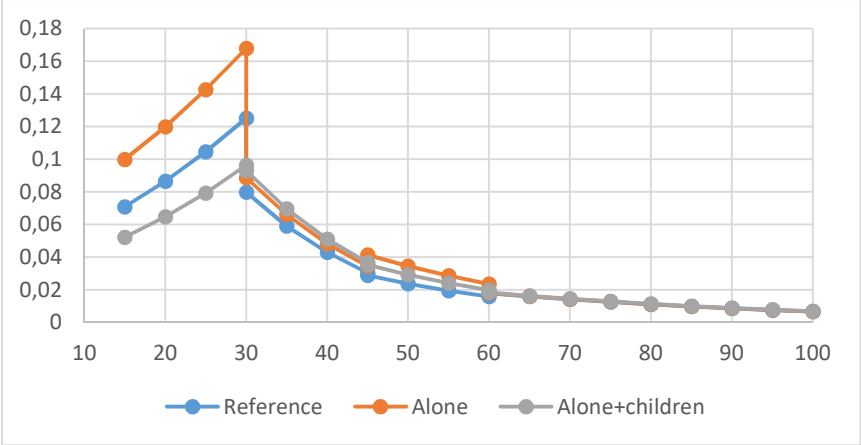
Figure 5: Migration probability by age and nationality



Source: INSEE, MIGCOM data, Authors estimations

Figure 6 and Appendix Table 8 illustrate the effect of family status and household head age on migration probability. Between 15 and 29, migration probability increases when household heads are alone. Single household heads have greater flexibility and autonomy in making migration decisions. They might face fewer constraints related to family considerations, making it easier for them to pursue opportunities in different locations. For couple (the reference category) or single-parent household heads, migration decision is influenced by a combination of personal and familial considerations. The difference between household family structures is significant between 15 and 59, and it is not significant at all for older. Controlling for family structure and other characteristics, migration probability increases from 15 to 29, and decreases regularly until the end of life cycle.

Figure 6: Migration probability by age and family structure

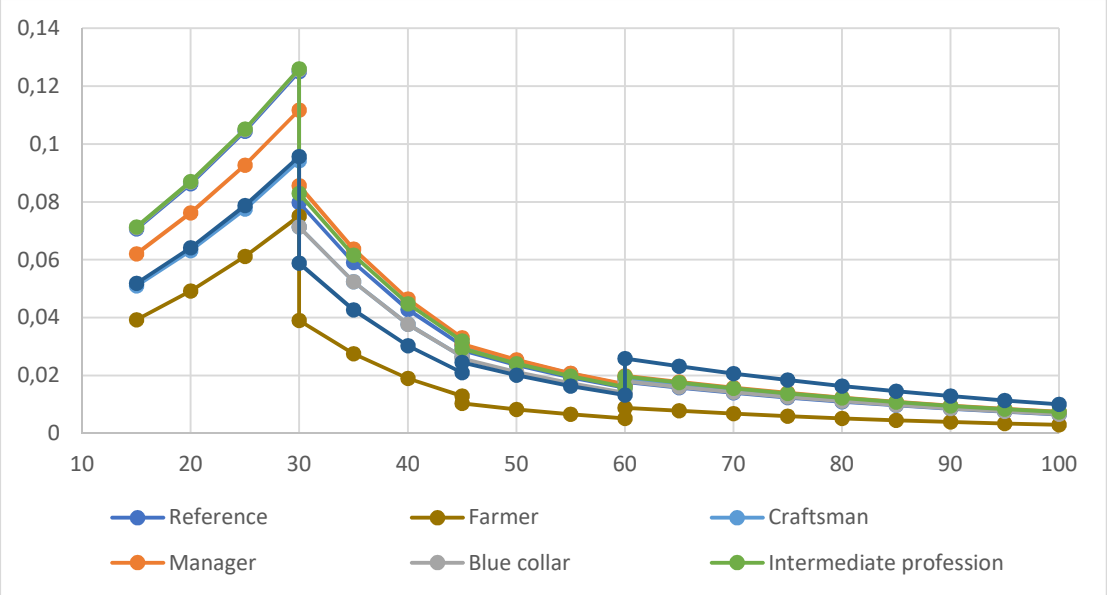


Source: INSEE, MIGCOM data, Authors estimations

Figure 7 and Appendix Table 9 illustrate the effect of profession and household head age on migration probability. All over the life cycle, migration probability is high when household heads are managers, employees (the reference category) or having an intermediate profession. Managerial and intermediate professions often come with greater opportunities for

career mobility, including job transfers, promotions, and the pursuit of better employment conditions. Throughout the entire life cycle, migration probability is low for farmers which is potentially due to the nature of their work or ties to the agricultural sector. Controlling for profession and other characteristics, migration probability increases from 15 to 29, and decreases regularly until the end of life cycle.

Figure 7: Migration probability by age and profession



Source: INSEE, MIGCOM data, Authors estimations

Our analysis on household migration and the influence of local tax rates difference on migration yielded significant findings which are represented in figures 8 (for flat tenant in the private sector) and 9 (for flat owners) and Appendix Figure 10 (for house tenants in the private sector), Appendix Figure 11 (for home owners) and Appendix Figure 12 (for tenants in the social housing sector). All figures display local tax rates confidence intervals.

Each figure illustrates the impact of local tax rates on migration across four distinct age groups. Within each age category, including owners (flat, house) and tenants in the private sector (flat, house), we perform a total of 9 estimations which account for various household head characteristics, as well as disparities in local amenities and tax rates between departure and arrival municipalities. Therefore, each figure encompasses a total of 36 estimations. For tenants in the social housing sector, and for each age category, we conduct only 5 estimations due to a lack of information concerning the rental prices in social housing sector. In aggregate, considering the five different tenure statuses, we execute a total of 164 estimations. This comprehensive approach allows us to analyze and compare the influence of local tax rates on migration across diverse demographic and housing scenarios.

Figure 8 illustrates confidence intervals measuring the influence of housing tax rate difference on flat tenant (private sector) migration, for different models. Within every age range of Figure 8, two distinct groups of housing tax rate confidence intervals are presented. The right group corresponds to housing tax rate confidence intervals estimations where population size

is not considered, while the left group reflects housing tax rate confidence intervals estimations where population size is controlled for.

Regarding the right group for each age range, the first confidence interval (in blue color: from the right to the left) belongs to the estimation where we consider household head characteristics and housing tax rate difference. There is a positive and significant association between housing tax rate difference and flat tenant migration. This association arises because housing tax rate acts as a proxy for local public goods and services. Regardless of the households' life cycle, an increase in the housing tax rate difference increases flat tenant migration.

For the second estimation model, we include local public investment per capita as a new municipal variable. A discernable gap emerges between the second confidence interval (represented by the garnet color) and the first one. This gap indicates a diminished impact of the housing tax rate difference on flat tenant migration when controlling for local public goods and services. By taking into consideration the local public investment per capita, we can evaluate the standard of local public goods and services, and local public amenities available to residents. Despite the observed reduction in influence, housing tax rate difference continue to have a positive and significant influence on flat tenant migration.

Expanding on the previous case, we control for flat rental price indices, serving as a proxy for unmeasured local public and private amenities, as well as housing quality. A slight gap emerges between the second and third confidence intervals (depicted in green), indicating a modest reduction in the estimate for young (15-29) and an unchanged effect for households where the head's age exceeds 30. Housing tax rate difference continue to have a positive and significant influence on flat tenant migration.

The orange confidence interval corresponds to the estimation model where we substitute flat renting price indices with the unemployment rate and the median households' income, to control for the overall health and economic status of the municipality. Unemployment rate and the median households' income offer insights into employment opportunities and the financial well-being of residents, which play a significant role in migration. The emergence of a new gap signals a reduced influence of housing tax rate difference on migration compared to the previous cases. Despite the decreased influence, housing tax rate difference remains a noteworthy factor influencing flat tenant migration.

In the final confidence interval of the right group (depicted in grey), we incorporate flat rental price indices into the estimation model used in the previous case. Change in the estimate is observed for young households (15 - 29), while estimates remain unchanged for households where the head's age is above 30. Nevertheless, housing tax rate difference still have a positive and significant influence on flat tenant migration.

The right confidence intervals' group for the four age categories confirms the manifestation of the 'voting with feet' effect proposed by Tiebout (1956), which holds true for flat tenant households in the private sector across all life cycles. Regardless of the age category, when controlling for local public investment per capita, flat renting price indices, household income, and the job market, housing tax rate difference has a positive and significant influence on flat tenant migration.

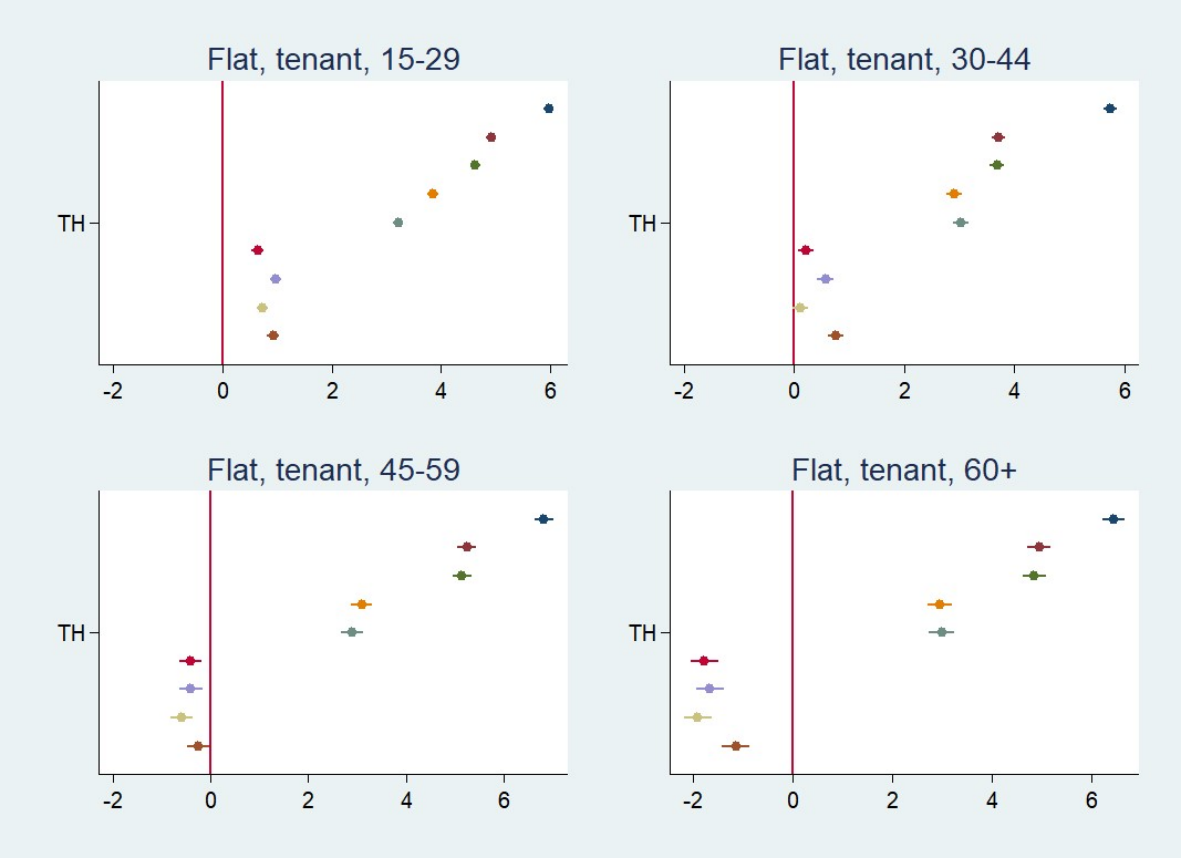
Concerning the left group, four new housing tax rate confidence intervals emerge when controlling for the population size.

The first interval (represented by the red color) belongs to the estimation where we consider household heads characteristics, housing tax rate, local public investment per capita, and the population size. The second interval (purple color) belongs to the estimation where we

include additional variables such as unemployment rate and median household income alongside the previously mentioned factors. The third confidence interval (mustard color) is related to the estimation where we substitute unemployment rate and median household income with flat renting price indices. For the last confidence interval (brown color), the estimated model includes all the variables used in this study: household heads' characteristics, housing tax rate, local public investment per capita, population size, unemployment rate, median household income, and the flat renting price indices.

When population size is controlled for, the influence of the housing tax rate difference on flat tenant migration undergoes a sudden change. The Tiebout "voting with feet" effect becomes less pronounced and less significant for young flat tenants (15 – 44) and is not significant for older (45 – 100). This outcome may be explained by the positive correlation between housing tax rate and population size. As the population grows, there is an increased demand for local public goods and services. Consequently, local governments often raise local tax rates to generate additional revenue to meet the growing demand. The dramatic impact of the housing tax rate difference on flat tenant migration, resulting from the inclusion of population size, prompts us to consider the possibility of an artifact caused by a spurious correlation between population size and housing tax rate.

Figure 8: Coefficient measuring the effect of housing tax rate difference on migration for flat tenants in the private sector, for different models



Source: Authors using MIGCOM data

Figure 9 illustrates confidence intervals measuring the influence of property tax rate difference on flat owner migration, for different models. Moving from the right to the left, the former five property tax rate confidence intervals correspond to estimations where population size is not considered, while the latter four property tax rate confidence intervals relate to estimations where population size is controlled for.

Considering solely household head characteristics and property tax rate difference (represented by the blue color), an increase in the property tax difference has a positive and significant influence on flat owner migration, all over the life cycle. The positive and significant influence stems from the fact that property tax rate acts as a proxy for the level of local public expenditure.

By controlling for the local public investment per capita, a new property tax rate difference effect emerges, represented by the second confidence interval (garnet color). A distinct gap becomes apparent like for flat renter case. This gap indicates a reduced influence of the property tax rate difference on flat owner migration, although the influence remains positive and significant.

Building on the previous situation, we control for flat prices, which serve as a proxy for unmeasured local public and private amenities and housing quality. A slight gap emerges between the second and third property tax rate confidence intervals (represented by the green color). This gap indicates a small reduction in the estimates for households where the head' age is between 30 and 44, and an increase for households where the head' age is over 45. For young (15 – 29), the estimates remain unchanged. Property tax rate difference still influence positively and significantly flat owner migration.

When substituting flat price indices with unemployment rate and median household income, a new property tax rate confidence interval emerges (represented by the orange color) indicating a decrease in the positive influence of property tax rate differences on flat owner migration.

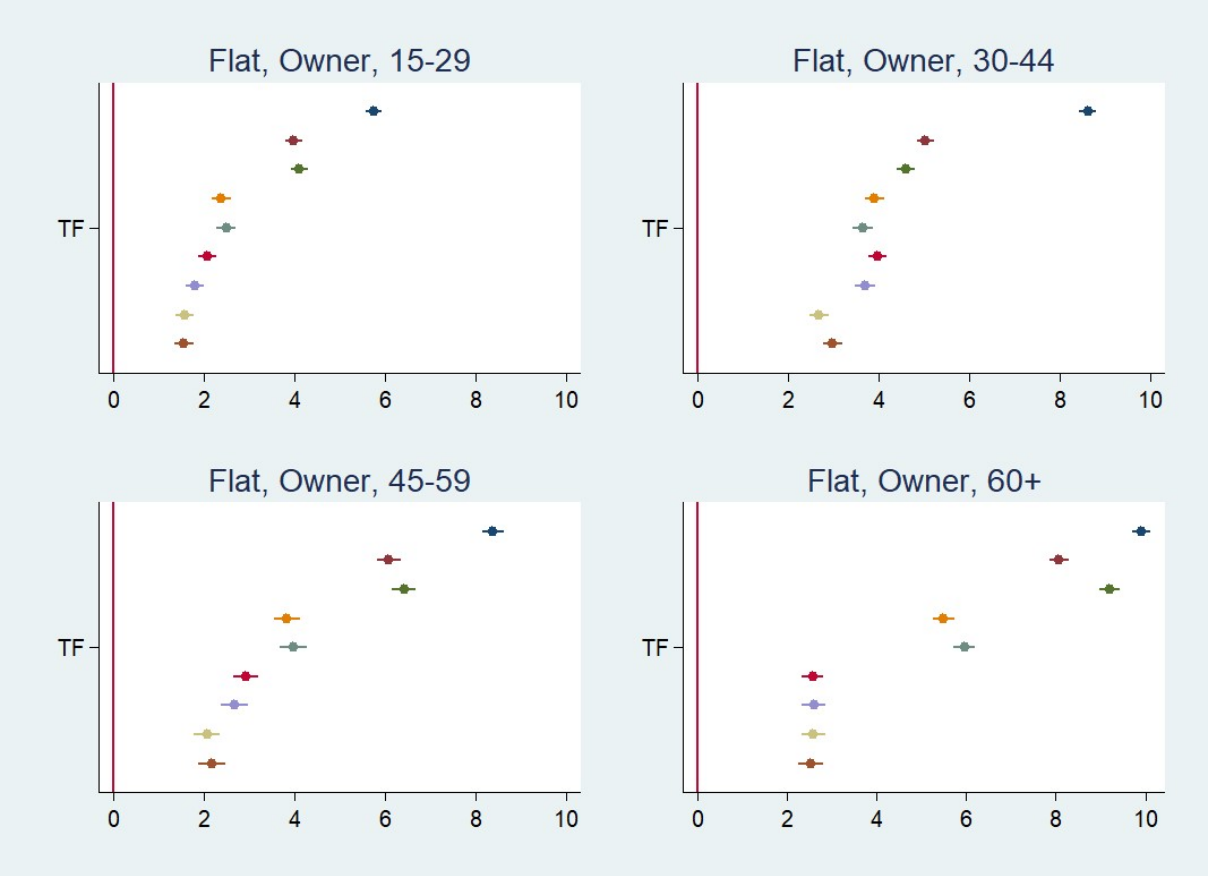
By including flat price indices into the previous case, the influence of property tax rate difference on flat owner migration remains largely unchanged all over the life cycle. The new property tax rate confidence interval is represented by the grey color.

Before controlling for the population size, "voting with feet" theory as proposed by Tiebout holds true for flat owner all over life cycle, similar to flat tenants.

Moving from the right to the left, the last four property tax rate confidence intervals relate to estimations accounting for population size effects. The first interval (represented by the red color) belongs to the estimation where we consider household heads characteristics, property tax rate, local public investment per capita, and the population size. The second interval (purple color) belongs to the estimation where we include the unemployment rate and the median household income alongside the previously mentioned factors. The third interval (mustard color) is related to the estimation where we substitute unemployment rate and median household income with flat price indices. For the last confidence interval (brown color), the estimated model includes all the variables used in this study: household heads' characteristics, property tax rate, local public investment per capita, population size, unemployment rate, median household income, and the flat price indices.

All over the life cycle, Tiebout "voting with feet" effect is significant even after accounting for population size, which was not the case for flat tenants. This result let us suggest that flat owners are strongly influenced by local public amenities and local property tax rate when deciding where to reside. The Tiebout effect is robust and not solely dependent on variations in the population size.

Figure 9: Coefficient measuring the effect of property tax rate difference on migration for flat owners, for different models



Source: Authors using MIGCOM data

Appendix Figure 10 showcases confidence intervals measuring the influence of housing tax rate difference on house tenant (private sector) migration, for different models. Moving from the left to the right, the former five housing tax rate confidence intervals correspond to estimations where population size is not considered, while the latter four housing tax rate confidence intervals relate to estimations accounting for population size effects. Throughout the life cycle, Tiebout "voting with feet" effect is not significant. This finding supports that house tenants' migration is not influenced by housing tax rate difference and local amenities. Houses often offer some private amenities such as gardens and more living space. Consequently, households living in houses may place less emphasis on local amenities and public services available in a particular municipality.

Appendix Figure 11 illustrates confidence intervals measuring the influence of property tax rate difference on house owner migration, for different models. Moving from the left to the right, the former five property tax rate confidence intervals correspond to estimations where population size is not considered, while the latter four property tax rate confidence intervals relate to estimations where population size is controlled for. All over the life cycle, Tiebout effect is found to be not significant when the population size is not considered. However, the Tiebout effect becomes significant when the population size is controlled for. The significant impact of population size on the relationship between property tax rate difference and house

owner migration leads us to consider a potential distortion caused by a spurious correlation between population size and property tax rate.

Appendix Figure 12 presents confidence intervals measuring the influence of housing tax rate difference on migration of tenants in the social housing, for different models. Because of lack information about the social housing rental prices, only 5 confidence intervals are presented. Similar to the flat tenant case, two distinct groups of housing tax rate confidence intervals are presented. The right group corresponds to housing tax rate confidence intervals without considering population size, while the left group reflects housing tax rate confidence intervals with population size controlled for. All over the life cycle, Tiebout "voting with feet" theory holds true only when the population size is not considered, similar to the case for flat tenants in the private sector. However, when population size is taken into account, the Tiebout effect is not significant.

5. CONCLUSION

Our study empirically explores the significance of Tiebout (1956) "voting with feet" theory across various tenure statuses and age groups of household. To the best of the authors' knowledge, no prior research has modeled the influence of local tax rates on residential mobility in France. In this paper, we test Tiebout (1956) for a sample of 13,18 million households with heads aged over 15, spread across 29,634 French municipalities (communes). We categorize our household sample into four distinct age groups for the household head in 2017: 15-29, 30-44, 45-59, and over 60. Additionally, we classify them into five tenure statuses: flat tenant in the private sector, flat owner, house tenant in the private sector, house owner, and social housing tenant.

For flat tenants in the private sector and social housing tenants, the Tiebout "voting with feet" effect remains robust and significant when we do not take into consideration the population size, throughout the entire life cycle. However, when population size is controlled for, the influence of the housing tax rate difference on migration suddenly changes. For house owners, the property tax rate difference has a negative influence on migration when population size is not controlled for. However, when it is controlled for, the influence becomes positive. In other words, without controlling for population size, the Tiebout effect is not significant; by controlling for it, the Tiebout effect becomes significant. The non-significance of the Tiebout effect lead us to suppose an artifact caused by the spurious correlation between population size and housing tax rate for flat tenants in the private sector and social housing tenants, and a spurious correlation between population size and property tax rate for house owners.

For flat owners, the Tiebout "voting with feet" effect remains significant even after accounting for the population size throughout the entire life cycle. By contrast, house tenants in the private sector de not exhibit a significant Tiebout effect, regardless of whether population size is controlled for or not. This lack of significance suggest that housing tax rate difference and local amenities may play a lesser role in the house tenants' migration.

Overall, our study sheds light on the nuanced relationship between local tax rates, local amenities, household head characteristics and tenure statuses, and migration behavior, providing valuable insights for policymakers and researchers in the field. The paper could be further developed by analyzing household residential choices through the application of a nested logit model.

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7. Appendix

Table 2: coefficients measuring the effect of household heads characteristics on migration

	15 - 29	30 - 44	45 - 59	+ 60
Age	0,021***	-0,031***	-0,016***	-0,009***
Bac-	-0,147***	-0,045***	-0,069***	-0,095***
Bac+	0,091***	0,021***	-0,002	0,036***
Bac	*Ref*	*Ref*	*Ref*	*Ref*
Renter, private sector	0,561***	0,510***	0,671***	0,724***
Renter, social sector	0,008**	0,032***	0,080***	0,053***
Other	0,517***	0,406***	0,542***	0,722***
Owner	*Ref*	*Ref*	*Ref*	*Ref*
Woman	0,048***	-0,054***	-0,015***	-0,00004
Man	*Ref*	*Ref*	*Ref*	*Ref*
Foreigner	-0,125***	-0,044***	-0,049***	-0,160***
French	*Ref*	*Ref*	*Ref*	*Ref*
Alone	0,187***	0,056***	0,163***	0,006**
Mono-parental	-0,153***	0,083***	0,091***	0,012
Other	0,178***	0,058***	0,184***	0,326***
Couple	*Ref*	*Ref*	*Ref*	*Ref*
Farmer	-0,288***	-0,355***	-0,412***	-0,269***
Craftsmen, shopkeeper	-0,165***	-0,058***	0,026***	0,023**
Manager - higher intellectual job	-0,067***	0,038***	0,029***	0,046***
Intermediate profession	0,004***	0,021***	0,007*	0,042***
Blue collar	0,003	-0,058***	-0,045***	0,005
Retired	-0,397***	-0,279***	0,091***	0,032***
Other	-0,156***	-0,158***	-0,068***	0,156***
Employee	*Ref*	*Ref*	*Ref*	*Ref*
Constant	-1,791***	-0,469***	-1,143***	-1,532***

Source: INSEE, MIGCOM data, Authors calculations

Table 3: Inter-commune migration rate, by age group

Migration	15 - 29	30 - 44	45 - 59	+ 60	Total
Migrant	461,069	262,462	122,392	101,732	947,655
Migration rate (%)	*15.26*	*8.41*	*3.95*	*2.57*	*7.18*
Non- migrant	2,559,989	2,857,669	2,974,717	3,845,452	12,237,827
Total	3,021,058	3,120,131	3,097,109	3,947,184	13,185,482

Source: INSEE, MIGCOM data, Authors calculations

Table 4: Inter-commune migration rate, by diploma and age group

Diploma	15 - 29	30 - 44	45 - 59	+ 60	Total
Bac -	1,275,815	1,079,797	1,685,344	2,814,011	6,854,967
Migration rate (%)	*9.47*	*7.48*	*3.70*	*2.41*	*4.84*

Baccalaureate	888,386	632,888	488,569	464,199	2,474,042
Migration rate (%)	*17.96*	*8.26*	*4.24*	*2.88*	*9.94*
Bac +	856,857	1,407,446	923,196	668,974	3,856,473
Migration rate (%)	*21.01*	*9.19*	*4.24*	*3.05*	*9.58*

Source: INSEE, MIGCOM data, Authors calculations

Table 5: Inter-commune migration rate, by tenure status and age group

Tenure Status	15 - 29	30 - 44	45 - 59	+ 60	Total
Owner	1,083,711	1,579,196	1,925,728	2,777,967	7,366,602
Migration rate (%)	*7.71*	*5.80*	*2.38*	*1.44*	*3.55*
Renter, private sector	962,357	765,325	494,321	445,577	2,667,580
Migration rate (%)	*24.28*	*15.07*	*10.13*	*6.99*	*16.13*
Renter, social sector	609,596	615,683	552,871	506,498	2,284,648
Migration rate (%)	*7.77*	*5.84*	*2.92*	*1.53*	*4.69*
Other[3]	365,394	159,927	124,189	217,142	866,652
Migration rate (%)	*26.34*	*12.14*	*8.16*	*10.41*	*17.12*

Source: INSEE, MIGCOM data, Authors calculations

Table 6: Inter-commune migration rate, by gender and age group

Gender	15 - 29	30 - 44	45 - 59	+60	Total
Man	1,514,697	1,535,698	1,509,040	1,710,354	6,269,789
Migration rate (%)	*14.54*	*8.82*	*4.04*	*2.49*	*7.32*
Woman	1,506,361	1,584,433	1,588,069	2,236,830	6,915,693
Migration rate (%)	*15.98*	*8.01*	*3.86*	*2.64*	*7.05*

Source: INSEE, MIGCOM data, Authors calculations

Table 7: Inter-commune migration rate, by nationality and age group

Nationality	15 - 29	30 - 44	45 - 59	+60	Total
Foreigner	213,147	338,816	234,833	219,645	1,006,441
Migration rate (%)	*13.99*	*8.47*	*4.16*	*2.07*	*7.23*
French	2,807,911	2,781,315	2,862,276	3,727,539	12,179,041
Migration rate (%)	*15.35*	*8.40*	*3.93*	*2.60*	*7.18*

Source: INSEE, MIGCOM data, Authors calculations

[3] It includes households housed for free, those living in a non-ordinary housing, those renting in an Ephad or in a "foyer" and tenants of dwellings with furnished accommodation.

Table 8: Inter-commune migration rate, by family structure and age group

Family structure	15 - 29	30 - 44	45 - 59	+ 60	Total
Alone	552,527	448,785	573,794	1,248,591	2,823,697
Migration rate (%)	*28.54*	*10.94*	*6*	*2.60*	*9.69*
Mono parental	494,020	328,055	341,521	150,142	1,313,738
Migration rate (%)	*7.81*	*8.81*	*4.78*	*2.21*	*6.63*
Couple	1,754,185	2,248,938	2,096,061	2,334,484	8,433,668
Migration rate (%)	*12.18*	*7.74*	*3.13*	*1.92*	*5.91*
Other[4]	220,326	94,353	85,733	213,967	614,379
Migration rate (%)	*23.13*	*10.78*	*6.79*	*9.78*	*14.31*

Source: INSEE, MIGCOM data, Authors calculations

Table 9: Inter-commune migration rate, by Socio-professional category and age group

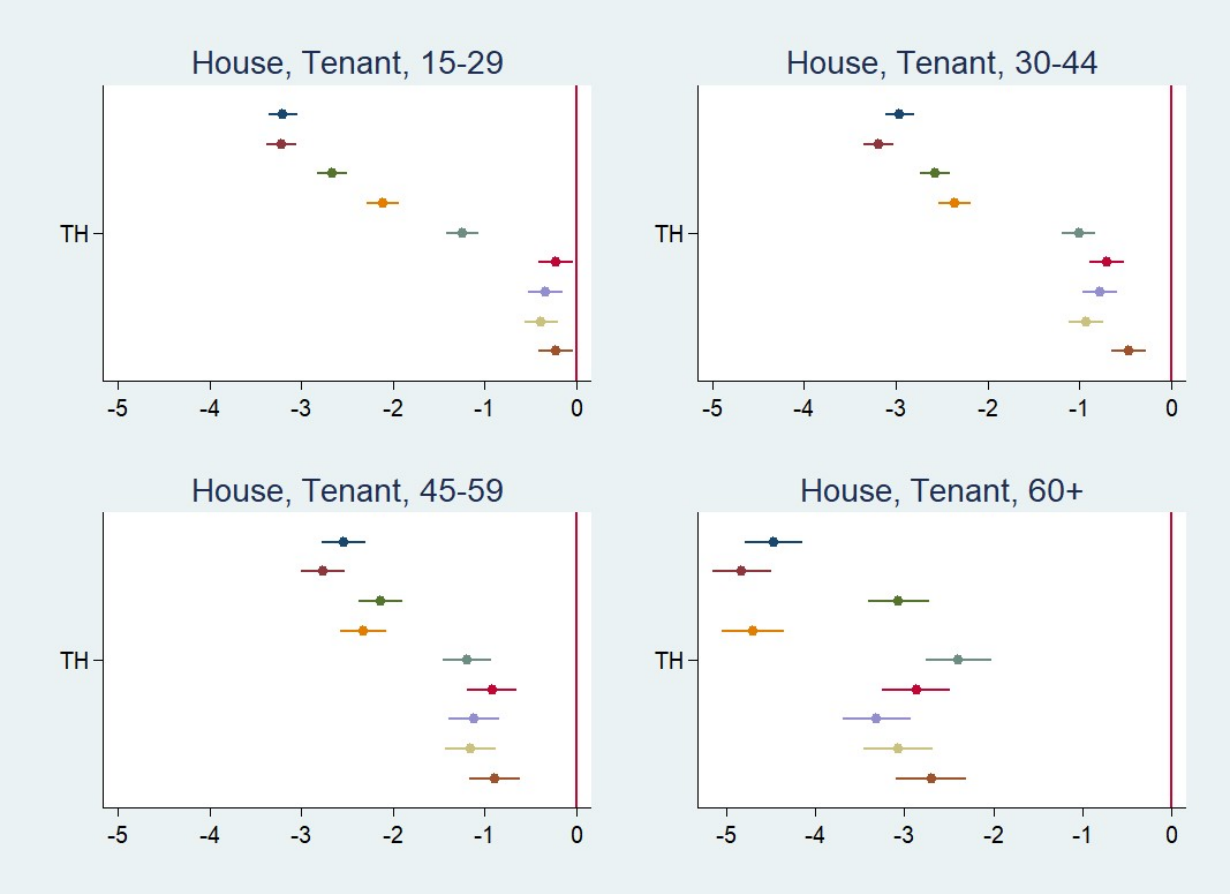
Profession	15 - 29	30 - 44	45 - 59	+60	Total
Farmer	24,200	28,427	49,061	21,183	122,871
Migration rate (%)	*6.16*	*3.59*	*1.11*	*0.9*	*2.64*
Craftsmen, shopkeeper	151,371	201,546	234,115	73,278	660,310
Migration rate (%)	*8.76*	*7.34*	*4*	*2.54*	*5.95*
Manager - higher intellectual job	380,191	552,920	505,801	136,833	1,575,745
Migration rate (%)	*14.82*	*9.70*	*4.09*	*2.88*	*8.54*
Intermediate profession	612,235	753,706	656,574	148,603	2,171,118
Migration rate (%)	*15.97*	*9.02*	*3.96*	*2.76*	*9.02*
Employee	715,536	676,308	703,072	229,632	2,324,548
Migration rate (%)	*14.17*	*8.68*	*4.08*	*2.40*	*8.36*
Blue collar	654,321	716,986	661,709	137,267	2,170,283
Migration rate (%)	*12.95*	*7.39*	*3.58*	*2.39*	*7.59*
Retired	53,100	50,296	112,716	2,936,448	3,152,560
Migration rate (%)	*4.72*	*3.87*	*3.73*	*2.09*	*2.22*
Other[5]	430,104	139,942	174,061	263,940	1,008,047
Migration rate (%)	*24.05*	*8.03*	*5.22*	*8.11*	*14.40*

Source: INSEE, MIGCOM data, Authors calculations

[4] Outside ordinary housing.

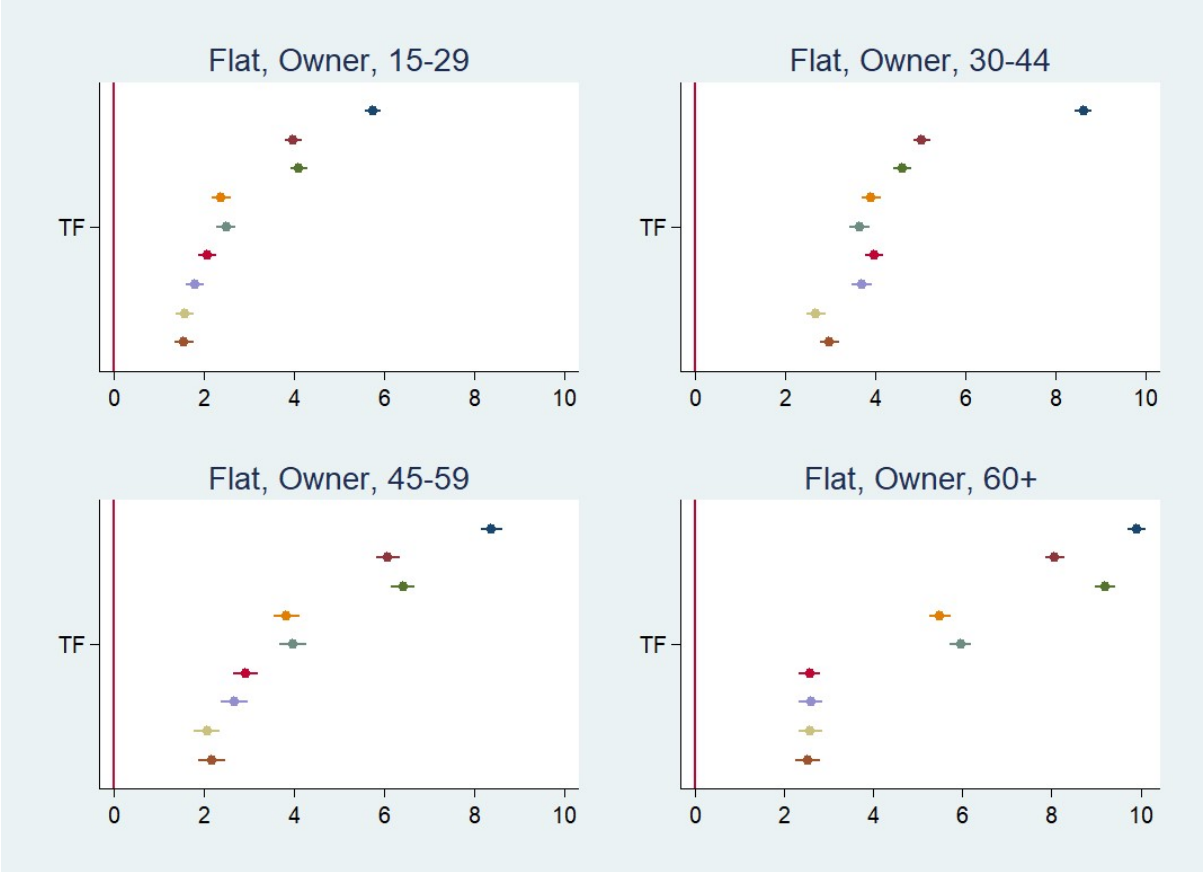
[5] Households without professional activity.

Figure 10: Coefficient measuring the effect of housing tax rate difference on migration for house tenants, for different models



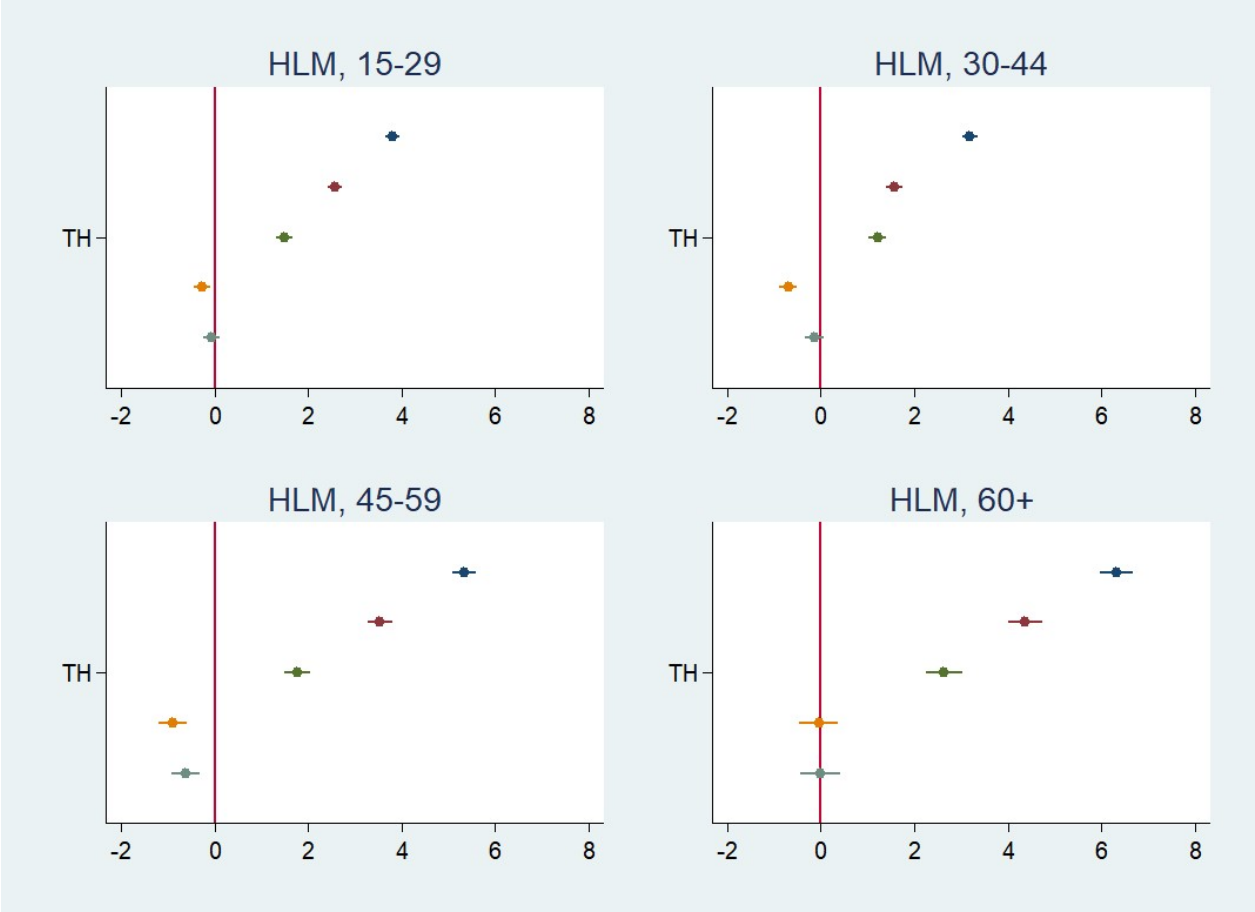
Source: Authors computations using MIGCOM data

Figure 11: Coefficient measuring the effect of property tax rate difference on migration for house owners, for different models



Source: Authors using MIGCOM data

Figure 12: Coefficient measuring the effect of housing tax rate difference on migration for tenants in the social housing sector, for different models



Source: Authors using MIGCOM data