Renters vs owners. What is the evolution of the residential location choice preferences for accessibility? The case of the Lyon urban area in France, 1999-2013

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1 Introduction

Accessibility is an essential location attribute explaining the residential location choices. Various works have showed its importance for residential choices in different contexts (Baraklianos et al. 2018; Eliasson 2010; Lee et al. 2010). However, this importance is likely to change and evolve over time. Changes internal to the land-use and transport system (improvement or deterioration of transportation system, relocations of activities) or external (perception of individuals) can influence how accessibility is valued by the households (Kasraian et al. 2016; Portnov et al. 2011).

As there are new transport infrastructures and economic growth, accessibility rises more and more. People can enjoy more activities at a same or lower generalised cost (Handy and Niemeier 1997). Consequently, as accessibility becomes more available, its importance for a residential location choice might decrease. On the contrary, today, despite the constant increase of accessibility of the urban areas, we observe a revival of the city centres across Europe (Buzar et al. 2007; Melia et al. 2018; Rérat 2015) and USA (Deka 2018; Moos 2013). Arguably, this re-urbanisation is mostly triggered by younger generations, the so-called millennials (roughly the generations born during the 80s and 90s (Deka 2018)). Various explanations had been given to this phenomenon (economic circumstances, anti-car culture) (Deka 2018; Melia et al. 2018; Myers et al. 2019). Despite the various interpretations of this behaviour, a common denominator seems to be the preference for accessibility for the residential location choices (Thomas et al. 2015).

Two opposing residential preferences emerge in terms of preferences for accessibility. A characteristic qualifying these two diverging residential choice behaviours is the type of choice (Haque et al.). On the one hand, households that make a long-term decision are less sensitive to accessibility. They seem to take advantage of the transport improvements to buy a residential unit in locations outside the highly accessible city centres. On the other hand, young households that make a short/medium-term choice are very sensitive to accessibility. They select to rent a house in locations that offer high accessibility, despite the constant increase of accessibility.

A question that arises in this context is how different are the preferences for accessibility between the renters and the owners and more importantly how the preferences of those two groups evolve over time? In case of accessibility increase, do the two groups have the same reaction? If not, how do they adapt the owners and the renters their location choices?

In this paper, we aim to contribute to the understanding of the location choices of households bypassing some limits of the previous works. Building on previous knowledge, we analyse the evolution of the preferences of renters and owners over time, with a special focus on accessibility. For that, we rely on a discrete choice residential location model for the Lyon urban area in France. We use data for residential location choices drawn from the disaggregated census data of 1999, 2008 and 2013 and we estimate elasticities to measure the evolution of the sensitivity to accessibility and other location attributes.

2 Previous works

While the observation that renters have a higher preference for accessibility than owners is not new, recent works highlight that this tendency is reinforced after the 2000s. This trend is identified as a

revitalisation process of the city centres due to the massive move of young households (Millsap 2016). This tendency is highlighted in the works of Florida (2004) and Glaeser et al. (2001), suggesting that the reason behind this re-densification of the city centre is the presence of rich amenities in central - high accessible areas. In the few empirical works, analysing the temporal evolution of the households' location preferences the results are not conclusive. Rezaei and Patterson (2016), making a temporal analysis of the residential location choices in Montreal, between 1996 and 2006, found that in fact the households are becoming more sensitive to accessibility with time. However, the authors do not distinguish in their analysis between owners and renters for the accessibility variable, but the majority of the sample were renters (69%). We assume that this observation is due to the behaviour of renters. Furthermore, we do not know what the evolution of accessibility was during that time. Any observed changes could be due to the accessibility improvements or deteriorations. A study for London (Haque et al.) analysed the temporal evolution of the residential choices of renters and owners, until 2002 and found a different result. The authors argue that the owners became more sensitive to the distance to city centre while the renters quit the city centre because of the increase of rents. However, the use of the same data to characterise the alternatives for various observations in time poses a methodological problem. We do not know the level of location attributes of the time that the choice was made.

3 Study area – Evolution of the population and transport supply

Our study focuses on the Lyon urban area in France. During the past 50 years, the urban area has increased its population by almost 50%. During the post-war era and until the 1990s, the population of the city centre decreased dramatically, by 18% during the period 1968-1990 while the population of the whole area increased by 23%. From 1990 and afterwards, the tendency changes and the population of the centre starts to increase. In the period 1990-2013, the population of the centre increased by 22% super passing even the increase rate of the whole area, which was 20% during the same period. The analysis of the number of households by housing occupancy status reveals that this population increase was mostly due to renters.

Regarding the transport network, during the last 15 years, the public transport network of Lyon has been improved significantly. While the metro has been improved marginally during the period 1999-2013 with some extensions (3 new stations), the investments on the tramway network were substantial (figure 1). During the same period, there were not any significant car infrastructure investments in the study area. On the contrary, local authorities applied a policy aiming to decrease the importance of the car in the city of Lyon. Principally, they reallocated the urban space from car to public transport (tram lines, lanes for Buses with High Level of Service) or to other softer means of transport (bike lanes, pavement widening).

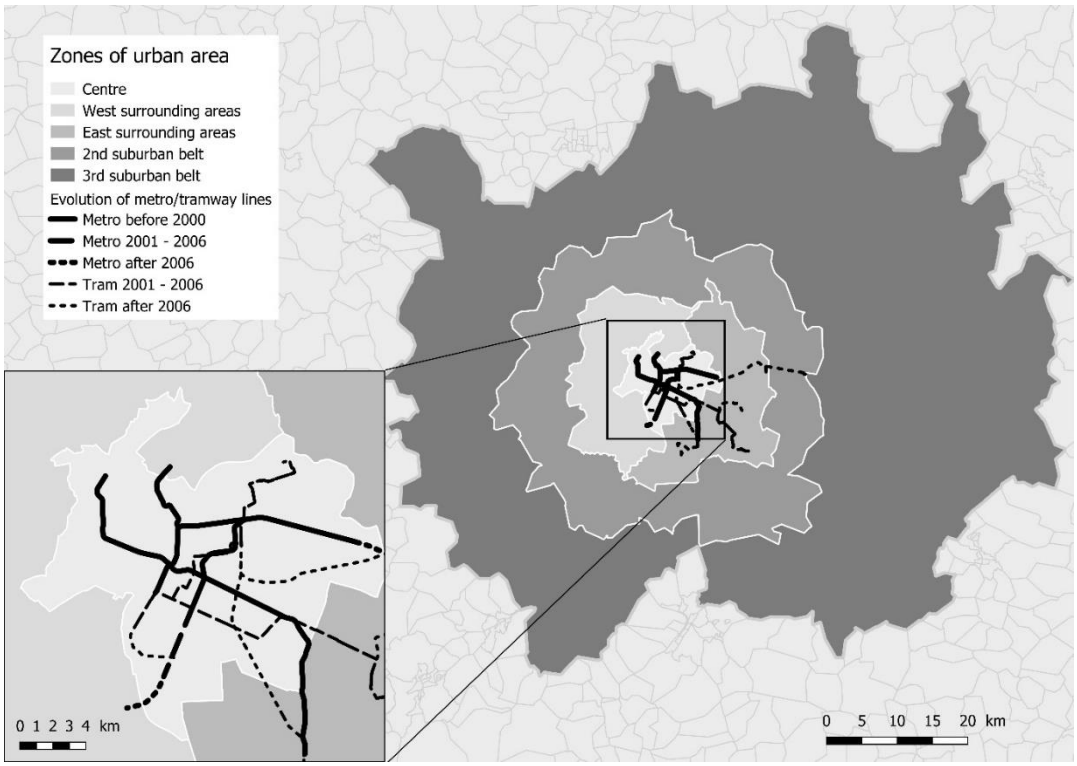

Figure. 1. *Aggregate urban area zoning and the metro/tramway network evolution*

4 Method and data

4.1 Residential location choice model

The modelling method used in this study is based on discrete choices (McFadden 1977). In the Multinomial Logit (MNL) model, the deterministic/observable part of the utility depends on the attributes of the alternatives (zonal, dwelling etc.) and on the socio-demographic characteristics of the households. The utility function takes the form of equation 1.

$$V_{in} = \alpha X_i + \beta Z_{in} \quad (1)$$

V_{in}: Deterministic part of the utility of household n at i
X_i: A vector of zonal attributes
Z_{in}: Interaction terms of socio-demographic characteristics of household n with the attributes of alternative i
α, β: Parameters to be estimated

A limit of the logit model is the assumption that the error terms are IID, which is unlikely in a spatial context (Ibeas et al. 2013). Other modelling structures like nested, cross-nested or mixed logit relax this hypothesis. However, these structures need an a priori assumption on the correlation structure and are difficult from an estimation point of view. Furthermore, they do not seem to improve empirically the modelling results for our case study (Aissaoui 2016). Another option is to introduce spatially lagged terms into the deterministic part of the utility function (equation 2) (Alamá-Sabater et al. 2011; Rezaei and Patterson 2016).

$$V_{in} = \alpha X_i + \beta Z_{in} + \delta(\alpha X_i' + \beta Z_{in}') \quad (2)$$

X_i': A vector of spatially lagged variables
Z_{in}': A vector of spatially lagged variables for the interaction terms
δ: Spatial lag scale capturing the average influence of all the spatially lagged terms

The applied residential location choice model in our study is a Spatial MultiNomial Logit (SMNL) model and the alternatives are neighbourhoods. The study area is divided into 431 zones / neighbourhoods. The estimation of a model with such a high number of alternatives is computationally difficult. When there is such a large number of alternatives, the parameters can be estimated using a random sample of alternatives D_n of the true choice set C_n and get consistent parameters (equation 2) (McFadden, 1977). We tested for various sample sizes of the D_n, up to fifty choices using various sampling strategies. We concluded that the best sample for the estimation is a random sample of seven random choices, the observed choice included, for every observed household choice (Aissaoui et al., 2015).

The extraction of the observed residential choices was possible using the disaggregated census data provided by the INSEE, for the years 1999, 2008 and 2013. Using this database, we identify the households moved in a certain neighbourhood during the last two years, the recently moved households. This way we have 112,112 observations during 1998-1999, 102,920 observations during 2006-2008 and 120,623 during 2011-2013. The database contains information about the households like car ownership, number of individuals by household, the age of the household head and the status of the housing occupancy (owner/renter).

4.2 Determinants of location choices

Studying the temporal evolution of residential location choice preferences does not only require disaggregated data of observed choices but also data on the attributes of the alternatives. This was possible through a combination of various databases. Ideally, data on location attributes must be for the beginning of the analysis period, to guarantee the exogeneity of these attributes. For example, for household choices made during the period 2006-2008, we need data characterising the alternatives for 2006. If we use data of periods long after the observed choices, it is possible that the location attributes have changed, thus they have no value on explaining residential location choices. Nevertheless, it is very difficult to have the same historical data for the desired year. Because it was not always possible in our case, we had to do some concessions, staying methodologically sound, which we describe in detail in this chapter. The variables included into the model are divided into three categories, the spatial amenities, the social environment and the market trade-off (Aissaoui 2016). Table 1 summarises the descriptive statistics of the zonal attributes. For a more detailed discussion of the variables, please refer to Baraklianos et al. (2019).

Table 1. *Descriptive statistics and spatial autocorrelation of the zonal attributes*
Sources: INSEE, INSEE-SIRENE, PERVAL, LAET, authors' calculations

Variable description	Variable	1999			2006			2011			Spatial Lag term
		Mean	SD	Moran's I	Mean	SD	Moran's I	Mean	SD	Moran's I	
Social environment											
Social housing share of households (%)	%HLM	0.11	0.18	0.43	0.12	0.17	0.39	0.12	0.16	0.42	Yes
Share of the 3rd quantile of revenue (%)	%REV3	0.23	0.04	0.30	0.25	0.07	0.37	0.22	0.04	0.41	Yes
Share of the 4th quantile of revenue (%)	%REV4	0.20	0.04	0.30	0.19	0.06	0.40	0.21	0.05	0.50	Yes
Share of the 5th quantile of revenue (%)	%REV5	0.21	0.10	0.51	0.19	0.12	0.54	0.22	0.10	0.52	Yes
Spatial amenities											
Proximity to basic shopping service (number) (0,1)	Prox Basic Serv	0.84	0.34	0.18	0.85	0.35	0.24	0.86	0.35	0.20	No

Primary schools (number)	Prox Pr. Schools	3.79	3.52	0.11	3.79	3.43	0.12	4.1	3.67	0.12	No
Secondary schools (number)	Prox Sec. Schools	0.54	0.97	0.01	0.54	0.92	0.00	0.69	1.35	-0.01	No
Market trade-off											
Mean zonal housing price (€ 2013/m^2)	Housing price	951	268	0.72	2,753	535	0.73	2,503	487	0.63	No
Accessibility to employment	Acc. Emp.	51,333	58,228	0.91	68,482	70,817	0.97	84,018	76,360	0.96	No

5 Obtained results and analysis

Due to scale differences between models estimated for different years, we cannot directly compare the parameters. All the variables, except of the proximity to basic services, are continuous, so we can calculate mean point elasticities (equation 3), which are directly comparable. Elasticities are also more convenient in terms of interpretation. The mean point elasticity suggests the mean effect that an increase of 1% of this variable will have on the choice probability *ceteris paribus* (Washington et al. 2011).

Mean point elasticity

$$E_k = \frac{\sum_{i=1}^{I}(1 - P_{in})\,\hat{\beta}_k\,X_{ink}}{I} \qquad (3)$$

E_k: Mean elasticity for variable k
I: The number of households
P_{in}: The probability of household i choosing the location n
$\hat{\beta}_k$: The estimated parameter for k
X_{ink}: The value of k for i at n

Concerning the evolution of both accessibility and housing price, they present very different elasticity evolutions between the renters and the owners. For renters, the elasticity of accessibility increases during the analysis period, meaning that the renters become more sensitive, despite the strong increase of the accessibility levels. More precisely, the elasticity increases almost linearly, from 1.71% in 1999 to 1.90% in 2008 reaching at 2.32% in 2013. On the contrary, the elasticity of the owners for accessibility decreases during the analysis period. From 1.02% in 1999 passes to 0.67% in 2008 and to 0.57% in 2013. At the same time, the evolution of the elasticity of the housing price follows the same tendency, as expected. Renters become less sensitive while the owners more sensitive. For renters, the evolution is not linear but they show a tendency to be less sensitive. For owners, the decrease of elasticity is sharper and almost linear. The evolution of the elasticity for housing price is almost parallel to the elasticity for accessibility, proving the perfect trade-off for owners.

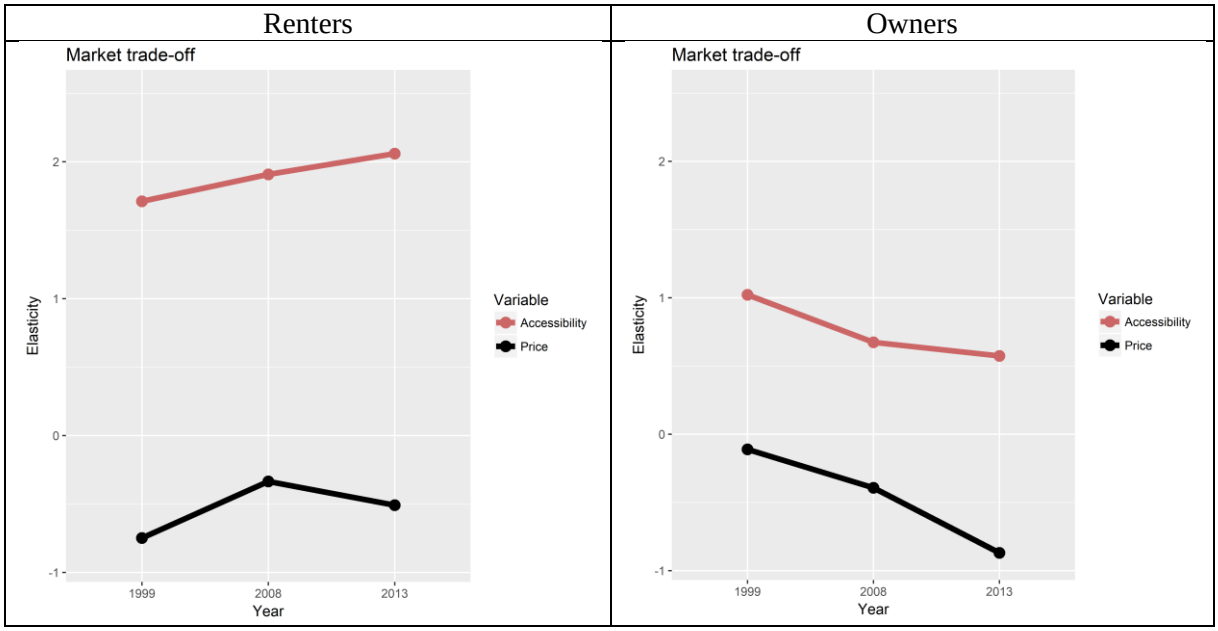

Figure 2. *Evolution of elasticities by variable group and by renters/owners*
Source: Authors' estimations

6 Conclusions

The results for the urban area of Lyon confirm the findings of the empirical literature about the sensitivity of the renters. The evolution of the preferences shows that, despite the fact that renters had already higher preference for accessibility at the first analysis period (1999), the difference between owners and renters increases over time. Owners show a decreasing preference for accessibility, while renters the exact opposite. For owners this means that they have a more rational location choice behaviour (Inoa et al. 2015). The increase of accessibility led to a decreased preference for accessibility, consistent with the urban economics theory. On the contrary, renters, which make a short-term decision, can be less rational. They present an increasing preference for accessibility. This choice behaviour is related to their socio-demographic profile, which explains why accessibility is very important for their residential location choices (Melia et al. 2018). They are more likely to be younger, at the beginning of their career and more importantly without children (Plaut 2006). It seems that there is a relation between the car ownership levels and the preferences for accessibility, without being able to define the direction of this causality.

Bibliography

Aissaoui, H.: Choix de localisation résidentielle des ménages en milieu urbain. Les apports récents des modèles de choix discrets en présence d'un nombre élevé d'alternatives. (2016)

Aissaoui, H., Bouzouina, L., Bonnel, P.: Choix de localisation résidentielle, entre contraintes du marché et préférences individuelles : application à l'aire urbaine de Lyon 1999. Rev. d'Economie Régionale Urbaine. 4, 629–656 (2015)

Alamá-Sabater, L., Artal-Tur, A., Navarro-Azorín, J.M.: Industrial location, spatial discrete choice models and the need to account for neighbourhood effects. Ann. Reg. Sci. 47, 393–418 (2011). doi:10.1007/s00168-010-0383-7

Alonso, W.: Location and land use : toward a general theory of land rent. Harvard University Press, Cambridge, Mass. (1964)

Axhausen, K.W.: Accessibility: Long-term perspectives. J. Transp. Land Use. 1, 5–22 (2008). doi:10.5198/jtlu.v1i2.66

Baraklianos, I., Bouzouina, L., Bonnel, P., Aissaoui, H.: Does the accessibility measure influence the results of residential location choice modelling? Transportation (Amst). (2018). doi:s11116-018-9964-6

Baum-Snow, N.: Did Highways Cause Suburbanization? Q. J. Econ. 122, 775–805 (2007). doi:10.1162/qjec.122.2.775

Bhat, C.R., Carini, J., Misra, R.: Modeling the Generation and Organization of Household Activity Stops. Transp. Res. Rec. J. Transp. Res. Board. 1676, 153–161 (1999). doi:10.3141/1676-19

Bhat, C.R., Handy, S., Kockelman, K., Mahmassani, H., Weston, L., Gopal, A., Srour, I.: Development of an urban accessibility index: Formulations, aggregation and application. , Texas (2002)

Bouzouina, L.: Ségrégation spatiale et dynamiques métropolitaines, (2008)

Bouzouina, L., Nicolas, J.-P.: Du « tout voiture » au « Vélo'v », cinquante ans d'évolution du système de transport lyonnais. In: Rosales-Montano, S., Aguilera-Belanger, A., Mignot, D., and Terral, L. (eds.) L'expérience métropolitaine lyonnaise. pp. 43–44. FNAU, Paris (2015)

Brueckner, J.K., Thisse, J.F., Zenou, Y.: Why is central Paris rich and downtown Detroit poor? An amenity-based theory. Eur. Econ. Rev. 43, 91–107 (1999). doi:10.1016/S0014-2921(98)00019-1

Buzar, S., Ogden, P., Hall, R., Haase, A., Kabisch, S.: Splintering Urban Populations : Emergent

Landscapes of Reurbanisation in Four European Cities. 44, 651–677 (2007)

Cabrera Delgado, J., Bonnel, P.: Level of aggregation of zoning and temporal transferability of the gravity distribution model: The case of Lyon. J. Transp. Geogr. 51, 17–26 (2016). doi:10.1016/j.jtrangeo.2015.10.016

Can, A.: Specification and estimation of hedonic housing price models. Reg. Sci. Urban Econ. 22, 453–474 (1992). doi:https://doi.org/10.1016/0166-0462(92)90039-4

Cheshire, P.C.: Resurgent Cities, Urban Myths and Policy Hubris: What We Need to Know. Urban Stud. 43, 1231–1246 (2006). doi:10.1080/00420980600775600

Deka, D.: Are millennials moving to more urbanized and transit-oriented counties ? J. Transp. Land Use. 11, 443–461 (2018). doi:10.5198/jtlu.2018.1345

Eliasson, J.: The Influence of Accessibility on Residential Location. In: Pagliara, F., Preston, J., and Simmons, D. (eds.) Residential Location Choice: Models and applications. pp. 137–164. Springer (2010)

Florida, R.: The rise of the creative class and how it's transforming work, leisure, community and everyday life. (2004)

Garcia-Lopez, M.A.: Urban spatial structure, suburbanization and transportation in Barcelona. J. Urban Econ. 72, 176–190 (2012). doi:10.1016/j.jue.2012.05.003

Geurs, K.T., van Wee, B.: Accessibility evaluation of land-use and transport strategies: review and research directions. J. Transp. Geogr. 12, 127–140 (2004). doi:10.1016/j.jtrangeo.2003.10.005

Glaeser, E.L., Kolko, J., Saiz, A.: Consumer city. J. Econ. Geogr. 1, 27–50 (2001). doi:10.1093/jeg/1.1.27

Handy, S.L., Niemeier, D.A.: Measuring accessibility: An exploration of issues and alternatives. Environ. Plan. A. 29, 1175–1194 (1997). doi:10.1068/a291175

Haque, M.B., Choudhury, C.F., Hess, S.: Understanding differences in residential preferences between ownership and renting with consideration of changes over time: a case study of London. Working paper

Ibeas, Á., Cordera, R., Dell'Olio, L., Coppola, P.: Modelling the spatial interactions between workplace and residential location. Transp. Res. Part A Policy Pract. 49, 110–122 (2013). doi:10.1016/j.tra.2013.01.008

Inoa, I.A., Picard, N., de Palma, A.: Effect of an Accessibility Measure in a Model for Choice of Residential Location, Workplace, and Type of Employment. Math. Popul. Stud. 22, 4–36 (2015). doi:10.1080/08898480.2014.925318

INSEE: Recensement de la population, https://www.insee.fr/fr/statistiques/2409559, (2013)

Kasraian, D., Maat, K., Stead, D., van Wee, B.: Long-term impacts of transport infrastructure networks on land-use change: an international review of empirical studies. Transp. Rev. 36, 772–792 (2016). doi:10.1080/01441647.2016.1168887

Klein, N.J., Smart, M.J.: Millennials and car ownership: Less money, fewer cars. Transp. Policy. 53, 20–29 (2017). doi:10.1016/j.tranpol.2016.08.010

Lee, B.H.Y., Waddell, P., Wang, L., Pendyala, R.M.: Reexamining the influence of work and nonwork accessibility on residential location choices with a microanalytic framework. Environ. Plan. A. 42, 913–930 (2010). doi:10.1068/a4291

Levinson, D.: Density and dispersion: The co-development of land use and rail in London. J. Econ. Geogr. 8, 55–77 (2008). doi:10.1093/jeg/lbm038

McFadden, D.: Modelling the choice of residential location, http://cowles.econ.yale.edu/P/cd/d04b/d0477.pdf, (1977)

Melia, S., Chatterjee, K., Stokes, G.: Is the urbanisation of young adults reducing their driving ? Transp. Res. Part A. 118, 444–456 (2018). doi:10.1016/j.tra.2018.09.021

Meyer, J., Becker, H., Bösch, P.M., Axhausen, K.W.: Autonomous vehicles: The next jump in accessibilities? Res. Transp. Econ. 62, 80–91 (2017). doi:10.1016/j.retrec.2017.03.005

Milakis, D., Kroesen, M., van Wee, B.: Implications of automated vehicles for accessibility and location choices: Evidence from an expert-based experiment. J. Transp. Geogr. 68, 142–148 (2018). doi:10.1016/j.jtrangeo.2018.03.010

Mills, E.S.: Transportation and patterns of urban development: An Aggregative Model of Resource Allocation in a Metropolitan Area. Am. Econ. Rev. 57, 197–210 (1967). doi:10,1007/978-1-4684-4001-0

Millsap, A.: Location choice in early adulthood: Millennials versus Baby Boomers. Pap. Reg. Sci. 97, S139–S167 (2016). doi:10.1111/pirs.12240

Moos, M.: "Generationed" space: Societal restructuring and young adults' changing residential location patterns. Can. Geogr. 58, 11–33 (2013)

Muth, R.F.: Cities and housing: the spatial pattern of urban land use. University of Chicago Press, Chicago, IL (1969)

Myers, D., Lee, H., Simmons, P.A.: Cohort Insights into Recovery of Millennial Homeownership after the Great Recession. J. Hous. Econ. (2019). doi:10.1016/j.jhe.2019.01.004

Oakil, A.T.M., Manting, D., Nijland, H.: Determinants of car ownership among young households in the Netherlands: The role of urbanisation and demographic and economic characteristics. J. Transp. Geogr. 51, 229–235 (2016). doi:10.1016/j.jtrangeo.2016.01.010

Plaut, P.O.: The intra-household choices regarding commuting and housing. Transp. Res. Part A Policy Pract. 40, 561–571 (2006). doi:10.1016/j.tra.2005.10.001

Portnov, B.A., Axhausen, K.W., Tschopp, M., Schwartz, M.: Diminishing effects of location ? Some evidence from Swiss municipalities , 1950 – 2000. J. Transp. Geogr. 19, 1368–1378 (2011). doi:10.1016/j.jtrangeo.2011.07.017

Rérat, P.: Le retour des villes. Espac. Popul. sociétés. 3, (2015)

Rezaei, A., Patterson, Z.: Preference stability in household location choice: Using cross-sectional data from three censuses. Res. Transp. Econ. 67, 44–53 (2016). doi:10.1016/j.retrec.2016.11.006

Rosales-Montano, S., Aguilera-Belanger, A., Mignot, D., Terral, L.: L'expérience métropolitaine lyonnaise. FNAU, Paris (2015)

Schirmer, P.M., Van Eggermond, M. a. B., Axhausen, K.W.: The role of location in residential location choice models: a review of literature. J. Transp. Land Use. 7, 3–21 (2014). doi:10.5198/jtlu.v7i2.740

Thomas, E., Serwicka, I., Swinney, P.: Urban demographics Why people live where they do. (2015)

Vincent-Geslin, S., Pochet, P., Ortar, N., Bonnel, P., Bouzouina, L.: Je t'aime… moi non plus. EspacesTemps.net. (2017)

Waddell, P.: Accessibility and Residential Location: The Interaction of Workplace, Residential Mobility, Tenure, and Location Choices. Lincoln L. Inst. TRED Conf. 1–19 (1996)

Washington, S.P., Karlaftis, M.G., Mannering, F.L.: Statistical and econometric methods for transportation data analysis. CRC Press, New York (2011)

Zondag, B., Pieters, M.: Influence of Accessibility on Residential Location Choice. Transp. Res. Rec. J. Transp. Res. Board. 1902, 63–70 (2005). doi:10.3141/1902-08