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Touristification and the Unequal Incidence of Housing Shocks: Evidence from Tax Records

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Abstract

Touristification has emerged as a transformative yet contentious force in urban economies, creating both economic opportunities and displacement pressures. We estimate the impact of a rapid touristification boom on residential mobility, household income levels, and income composition in two European cities heavily exposed to tourism pressure. Using administrative tax records from 2016–2019 and an instrumental variable strategy based on proximity to tourist amenities, we show that short-term rental expansion significantly increased out-migration rates, particularly among lower-income residents and tenants. While incumbent homeowners who remain in highly touristified areas experience income gains, movers exhibit weaker labour-market outcomes. Our findings highlight the highly unequal incidence of tourism-driven housing shocks.

JEL classification

R31, R23, Z38, D63, C36

Keywords

short-term rental, household income, displacement, inequality

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1 Introduction

In many cities, rapid increases in housing demand can reshape urban neighbourhoods by raising housing costs and displacing incumbent residents, particularly when housing supply is slow to adjust (Baum-Snow, 2023; Howard and Liebersohn, 2025). Short-term rental (STR) platforms, such as Airbnb, allow for an almost immediate conversion of housing units into tourist accommodation, effectively shifting housing supply away from the local residential market. While a growing body of research emphasises their impact on housing markets, little is known about the impact on incumbent residents' displacement and income. In this paper, we tackle this unexplored research question, focusing on the cases of the two main Portuguese cities, Lisbon and Porto, where the conversion of permanent housing into short-term tourist accommodation occurred over a relatively short period, generating a sharp housing supply shock.

Our analysis relies on high-quality administrative personal income tax records from the Portuguese Tax Authority, that cover the universe of Portuguese tax payers between 2015 and 2019. This dataset is combined with 2011 individual census data to construct a subsample of long-term residents, i.e., with a higher attachment to the residence area. We further use the administrative registry of short term rentals that allows us to geolocate each registered dwelling, to construct fine civil parish level measures of short-term rental activity, our measure of exposure to touristification.

To estimate causal effects, we exploit the variation in STR density at the granular civil parish scale, instrumented with a shift-share (Bartik) instrument that combines pre-existing proximity to major tourist attractions with global demand for STR accommodation (Garcia-López et al., 2020; Goldsmith-Pinkham et al., 2020; Borusyak et al., 2025). This approach allows us to isolate the impact of the rapid expansion of short-term rental platforms on the mobility and economic outcomes of incumbent residents.

The main conclusion of our paper is that touristification has strong asymmetric effects on incumbent residents, depending on their income level, its composition, and homeownership

status. First, we find significant displacement effects for incumbent residents. A standard deviation increase in the density of STR leads to a 1.3 percentage points increase in the probability of an individual moving out of the municipality – an effect that rises to 8.2pp for residents of the most touristified civil parish, a rapid displacement process, when compared to gentrification.[1] Second, we document substantial heterogeneity in these responses driven by income level, income source, and housing tenure status. Individuals in the bottom quartile of the income distribution are 2.5 times as likely to move out of the origin municipality than the ones in top quartile. Moreover, individuals with property income above the median are shielded from displacement effects and homeowners are marginally less likely to be displaced than tenants. Third, long-term residents are less likely to move, a finding that is consistent with higher moving costs due to labour market or personal attachment. Fourth, we document robust impacts on income: we estimate a yearly gross income gain of €730.85 for each standard deviation increase in the touristification measure; in the most touristic civil parish of Lisbon, this amounts to €4662.82, i.e., an increase of 17.73% from baseline. Fifth, income gains are concentrated in homeowners who do not move away from the municipality.

We make three main contributions. First, we provide causal evidence on the effects of STR platforms on incumbent residents, complementing the existent literature that analyses their impact on housing prices and rents (Garcia-López et al., 2020; Koster et al., 2021; Batalha et al., 2022; Duso et al., 2024) and on local economic activity (Cruz et al., 2024; Hidalgo et al., 2024). Conversely, the literature on residential displacement has focused on long-term processes of urban gentrification (Brummet and Reed, 2021) or on shocks such as natural disasters (Deryugina et al., 2018). Second, we go beyond residential mobility and study additional margins of adjustment. In particular, we analyse how exposure to touristification affects household income level and composition – including employment, self-employment, and property income – as well as labour market outcomes. Finally, our high-quality administrative tax data allows us to document heterogeneous effects along several

[1] Brummet and Reed (2021) document increases in moving probabilities of between 2 and 3 percentage points over a 15-year gentrification process.

household and individual characteristics, shedding light on the highly unequal impacts of the fast urban conversion.

Related Literature. A growing body of evidence shows that STR activity drives up rents and housing prices, straining affordability for residents (Horn and Merante, 2017; Garcia-López et al., 2020; Barron et al., 2021; Duso et al., 2024).[2] For Lisbon, Franco and Santos (2021) estimate that a one-percent increase in STR share raises parish-level house prices by 3.2%, Gonçalves et al. (2022) find that a 2018 ban on STRs in central neighbourhoods reduced house sales and prices, while Batalha et al. (2022) document rent decreases following the pandemic shock to touristification. Regulations restricting STRs can reduce listings and house prices (Koster et al., 2021; Gonçalves et al., 2022), while traditional rent controls often backfire in the long run (Autor et al., 2014; Diamond et al., 2019).[3]

Relatedly, studies on spatial sorting, that can be fostered by STRs, touristification, or gentrification, emphasize how income, skills, and education shape neighbourhood change, intensifying inequality and displacement risks, with potential negative welfare consequences (Diamond, 2016; Baum-Snow et al., 2018; Couture and Handbury, 2020; Couture et al., 2024; Bibler et al., 2021; Calder-Wang, 2021; Su, 2022; Fogli et al., 2026). Beyond housing, STRs reduce hotel revenues (Zervas et al., 2017; Farronato and Fradkin, 2022), alter neighbourhood amenities and demographic composition (Almagro and Domínguez-Iino, 2025), and shift employment dynamics in local businesses (Cruz et al., 2024; Hidalgo et al., 2024).

Prior work often lacks micro-level data on incumbent residents, focusing instead on aggregate housing markets or local business dynamics (Glaeser et al., 2018, 2020). This gap is particularly salient given that welfare losses from urban change operate primarily through housing costs and heterogeneous mobility responses, rather than average wage effects, implying substantial within-location inequality among incumbent residents (Diamond and Gaubert,

[2]More broadly, housing markets are increasingly shaped by non-local demand and strategic pricing, whereby even small inflows of mobile or external demand can generate large price responses through search frictions and transaction spillovers (Badarinza and Ramadorai, 2025).

[3]Gaubert et al. (2025) show that place-based redistribution can improve welfare when inequality is geographically concentrated, providing support for locally targeted STR regulations.

2022; Ioannides and Ngai, 2025). Recent advances using credit records, Medicaid enrolment, or census-linked data have begun tracking individual mobility and welfare (Ding et al., 2016; Dragan et al., 2020; Brummet and Reed, 2021; French et al., 2023), focusing on slower gentrification processes. A recent exception is Allen et al. (2025), who use bank account and point-of-sales data to show that tourism generates positive average welfare effects for Barcelona residents once city-wide general equilibrium adjustments are incorporated. Related work also shows that business composition can anticipate neighbourhood gentrification, with cultural and creative sectors acting as 'pioneer' businesses (Behrens et al., 2024).

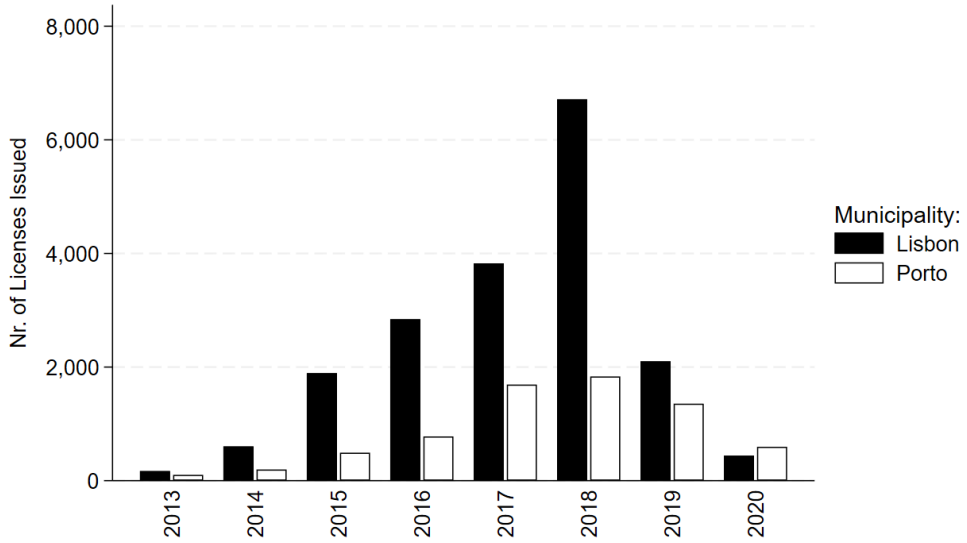
The remainder of this paper is organized as follows. Section 2 provides a contextual and institutional framework, information on the data and some descriptive statistics, as well as, explaining the methodology and empirical strategy used. Section 3 and beyond present results and conclusions.

2 Context, data and methodology

Lisbon witnessed a sudden increase in the number of foreign tourists, from 18.2 million in 2016 to 24.6 million in 2019 tourists. This is a considerable shock, given the 100.05 square-km area and the population of 549 457 residents in 2016. During the same period, the median residential property prices per square meter increased 73% and 69% in Lisbon and Porto, respectively.

The touristification process coincided with the enactment of a 2014 law that facilitated the licensing of properties for short-term rental platforms through a simple online registration. While registration is compulsory, acquiring and holding the license is costless, hence owners can keep it even if they do not rent their property or if they rent it long-term. Figure 1 displays the short-term rental registries in Lisbon and Porto. The drop in 2019 coincides with the strict ban implemented by the municipality in some downtown neighbourhoods, where the density of short term rental licenses, as a share of the total number of dwellings,

Figure 1: Number of new STR registrations per year in Lisbon and Porto



Source: National STR Record (Registo Nacional dos Estabelecimentos de Alojamento Local).
Notes: The figure shows the number of STR licenses issued per year within the municipalities of Lisbon and Porto.

was greater than 25% (Gonçalves et al., 2022).

2.1 Data and descriptive statistics

We use longitudinal administrative data from the Portuguese Tax Authority covering the universe of personal income tax records between 2016 and 2019, containing the municipality and civil parish of residence, gross income, and taxable income. From 2017 onwards, we also observe individual-level characteristics of household members, i.e., whether they are taxpayers or dependent members, civil status, date of birth, and gender. Furthermore, income is disaggregated by source, namely, employment, self-employment, and property income. The data do not include information on the employer or its location, nor on the location of the property generating property income.[4] We complement the household-level information with an indicator of tenure status, distinguishing between homeowners and tenants. This variable is not available for the full sample; it is observed only for individuals

[4]As a result, we cannot determine whether property income is generated from properties located in the same civil parish as the household residence.

who filed a 2014 personal income tax return.[5]

To control for pre-existing differences across locations, we use individual tax records from 2015 to construct pre-trend controls, aggregated at the tax office level. In Portugal, taxpayers are administratively assigned to tax offices based on their place of residence. However, tax office boundaries do not map one-to-one to civil parishes. Appendix Table A.1 documents the correspondence between civil parishes and tax offices. The absence of civil parish identifiers in the 2015 data motivates our use of tax office–level aggregates for pre-trend controls.

To measure exposure to touristification at the civil parish level, we use the National Register of Local Accommodation (RNAL), the official administrative database managed by Turismo de Portugal. This registry compiles information on all legally registered short-term rental establishments operating in Portugal, providing comprehensive and spatially detailed coverage of local accommodation activity. The dataset includes, among other variables, the registration number, address and geolocation (often including latitude and longitude), type of property (e.g., apartment or house), and guest capacity. Using this information, we construct measures of short-term rental intensity at the parish level, capturing both the spatial distribution and temporal evolution of tourist accommodation. This allows us to derive a consistent, administratively validated proxy for local tourist pressure, commonly used in the literature to study processes of touristification and their effects on housing markets.

Our baseline sample consists of households whose head is 21 years of age or older. This restriction ensures a minimum level of labour market attachment and reduces the likelihood of including economically inactive households.[6] Appendix Figure A.2 shows a sharp increase in the probability of reporting positive labour income above this age threshold. We further restrict the sample to households who are fiscal residents of Portugal.[7] The analysis focuses on households residing in the municipalities of Lisbon and Porto in 2016, where the expansion

[5]This corresponds to 82.6% of the full sample.

[6]This age also coincides approximately with the end of a 3-year bachelors degree.

[7]The number of non-residents is negligible, i.e., 0.05% of the sample (221 individuals)

of short-term rentals was most pronounced.

For a subset of taxpayers observed in 2016 (82.9% of our main sample), we additionally observe the civil parish of residence in 2010. We use this information to define a subsample of *long-term residents*, namely individuals who have resided in the same civil parish since 2010. This group is of particular interest, as long-term attachment to the neighbourhood may shape both exposure and responses to housing market pressures. Descriptive statistics for this subsample are reported in Appendix Table A.3.

We complement the tax data with contextual information at the civil parish level. From the 2011 Population Census, we obtain measures of population density, unemployment rates, and the share of adults aged 25 or older holding a university degree. We also use data from the National Electoral Registry (*Recenseamento Eleitoral*) to obtain the number of registered voters at the civil parish level for the years 2013 and 2015. Additionally, we use the official georeferenced administrative boundaries from the *Carta Administrativa Oficial de Portugal* (CAOP), provided by the *Direção-Geral do Território*, to compute centroid-to-centroid geographic distances between municipalities. Finally, we obtain municipality-level average rents from Statistics Portugal's 2021 Census.

Outcome Variables. Our empirical analysis examines the differential impact of touristification, measured by the intensity of dwellings registered as short term rentals, on three types of outcomes for the taxpayers who lived in Lisbon or Porto in 2016. First, we study residential mobility, focusing on the probability of moving out of the main municipality (i.e., Lisbon or Porto), and the probability of moving out of the respective metropolitan area, between 2016 and 2019. Second, we analyse income impacts, focusing on gross and net income variations between 2016 and 2019, as well as gross and net variations and in the following income categories between 2017 and 2019: labour income and its components (employment and self-employment income), and property income. All income variables are expressed in real terms and deflated to 2016 prices using the consumer price index (CPI). Third, we study labour market transitions, namely, the probability of becoming employed and/or the

probability of becoming self-employed, between 2017 and 2019.

Note that income outcomes are measured at the household level and employment outcomes are measured at the household head level. Conversely, the mobility outcome is measured at the individual tax payer level, that is, it excludes dependents (i.e., individuals who belong to the household but do not have any income). In the portuguese tax system, tax reports include the income earners (either one or two) and possible household members that are not income earners. The latter are what we consider dependents (either elderly or children). Elderly members that earn a pension, for instance report tax on their own.

Table 1 reports the descriptive statistics of the main variables used in our analysis. It shows that 21.3% of the individuals moved out of the original civil parishes, 10.6% moved out of the municipalities of Lisbon and Porto between 2016 and 2019, and 3.2% left the respective metropolitan areas altogether. We analyse below the extent to which these mobility patters are driven by touristification. We also observe an average increase in gross and net income and in all its components. Only the average self employed income decreases. This is compatible with the slight decrease in self employment (0.6 percentage points) and the increase in employment (4.8 percentage points).

2.2 Methodology

Our objective is to estimate the causal effect of exposure to touristification on residents' mobility decisions and economic outcomes. We exploit variation across civil parishes in Lisbon and Porto, rather than comparisons between central municipalities and their surrounding suburbs in each metropolitan area. As a result, both high- and low-exposure areas are located within dense urban cores and share similar institutional environments, housing markets, and access to amenities.

Exposure is measured using the density of short-term rentals (STR density) in the civil

Table 1: Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Source	Level
STR density	454,701	-0.000	1.000	RNAL and Statistics Portugal	Civil Parish
Amenities SSIV	454,701	20,200,257.785	11,720,983.868	TripAdvisor and Google Trends	Civil Parish
Move Out Municipality	454,701	0.106	0.308	Tax Data	Individual
Move Out Metropolitan Area	454,701	0.032	0.176	Tax Data	Individual
Gross Income in 2016	454,701	29,921.982	42,877.696	Tax Data	Household
Δ Gross Income	454,701	7,247.852	38,828.225	Tax Data	Household
Δ Net Income	454,701	5,529.704	21,722.311	Tax Data	Household
Δ Labour Income	454,701	3,362.679	25,108.937	Tax Data	Household
Δ Wage Income	454,701	3,470.959	23,584.618	Tax Data	Household
Δ Self-employed Income	454,701	-108.429	9,421.523	Tax Data	Household
Δ Property Income	454,701	338.348	3,683.923	Tax Data	Household
Δ Employed Status	454,701	0.056	0.283	Tax Data	Household
Δ Self-employed Status	454,701	-0.006	0.276	Tax Data	Household
Δ Labour Status	454,701	0.048	0.251	Tax Data	Household
Pre-shock Income Growth Per Capita	454,686	1.607	0.723	Tax Data	Tax Office
Pre-shock Voter Growth	454,701	-0.010	0.012	Voter Registration	Civil Parish
Population Density in 2011 ($People/km^2$)	454,686	6,665.217	2,835.861	Census 2011	Civil Parish
Unemployment Rate in 2011	454,686	6.261	1.601	Census 2011	Civil Parish
% with College Degree over 25 in 2011	454,686	32.413	11.807	Census 2011	Civil Parish
Nr. Household Members	448,465	0.957	1.073	Tax Data	Household
Children Presence	448,465	0.281	0.449	Tax Data	Household
Elderly Presence	448,465	0.002	0.049	Tax Data	Household
Age	453,597	56.434	17.296	Tax Data	Individual
Female	453,597	0.565	0.496	Tax Data	Individual
Single	448,465	0.378	0.485	Tax Data	Individual
Married	448,465	0.531	0.499	Tax Data	Individual
Tenure Status	454,701	0.677	0.468	Tax Data	Household

Notes: The table reports descriptive statistics for all individuals in Lisbon and Porto. Δ income variables are differences between the years of 2017 and 2019, except for the gross income and net income variables which also have the difference between 2016 and 2019. Regarding the the property income, 82,577 of the individuals in the sample are part of a household that reports property income (that is 18.16% of the individuals in the sample). Pre-shock income growth per capita is between 2015 and 2016. Pre-shock voter growth reported is between 2013 and 2015. The variables taken from the Census 2011 have data reporting to that year. Tenure status (homeowners vs. tenant) is observed only for individuals who filed a 2014 personal income tax return. The demographic characteristics of the household or individuals are those of 2017.

Figure 2: Heat map of STR density by Civil Parish

(a) Lisbon Municipality (b) Porto Municipality

Note: The figure depicts the STR density per civil parish for Lisbon (left panel) and Porto (right panel), with darker (resp., lighter) colours representing higher(resp., lower) density.

parish of residence, constructed as follows:

$$\text{STR density}_{2016,j} = \frac{\text{Accommodation Registries}_{2016,j}}{\text{Dwellings}_{2016,j}}, \tag{1}$$

where $\text{Accommodation Registries}_{2016,j}$ denotes the stock of local tourist accommodation registrations in 2016, in civil parish j, and $\text{Dwellings}_{2016,j}$ is the corresponding stock of dwellings, i.e., the sum of residence, vacant houses, and tourist accommodations. The treatment variable is standardized to simplify the interpretation of the results. Figure 2 shows the spatial distribution of the treatment variable in the civil parishes in Lisbon and Porto.

We thus estimate the following baseline specification:

$$Y_{ij} = \alpha_m + \beta_1 \text{STR density}_{2016,j} + \beta_2 head_i + \beta_3 h_i + \beta_4 parish_j + \varepsilon_{ij} \tag{2}$$

Where Y_{ij} denotes one of the outcome variables described above for household (or individual) i in civil parish j, $\text{STR density}_{2016,j}$ is the treatment variable, α_m is a municipality fixed effect (Lisbon or Porto), $head_i$, h_i, and $parish_j$ are vectors of controls at the household head, i.e.,

the individual filing the tax declaration, household, and civil parish (or tax office) levels, respectively, and ε_{ij} is an error term. Standard errors are clustered at the civil parish level, which is the level of treatment variation.

Household-level controls include the number of household members, a children indicator that turns one when the household has at least one member below 18, and one dependent adult indicator for households that include retired or incapacitated adults with annual income below the statutory minimum pension. We also include a control for the household gross income in 2016. At the household-head level, we control for age, age squared, gender, and marital status.

Parish-level controls are included to absorb differential pre-treatment trends and local economic conditions. These comprise the tax-office pre-treatment per capita income growth between 2015 and 2016 and the civil parish pre-treatment voter population growth between 2013 and 2015.[8] The inclusion of pre-trends follows the recommendations of Roth et al. (2023) for estimation with few clusters and absorbs some of the common cluster-level shocks (MacKinnon and Webb, 2017; Canay et al., 2021; MacKinnon et al., 2023; Roth et al., 2023; Abadie et al., 2023). We also use civil parish population density, share of adults aged 25 or older holding a university degree, and unemployment rate, retrieved from the 2011 census data.

A key concern is that STR density may be endogenous to unobserved neighbourhood characteristics correlated with residents' outcomes, such as local amenities, labour market conditions, or pre-existing trends in neighbourhood attractiveness. While the extensive set of covariates controls for most of the channels through which the presence of short term rental (STR) properties could affect residents' outcomes, the treatment coefficient estimate could still be biased. On the one hand, STR expansion has been most pronounced in central urban areas that were simultaneously undergoing broader processes of regeneration, which could independently affect mobility and income outcomes. On the other hand, the impact of STR

[8] We do not observe the civil parish of residence in the 2015 tax data.

on the neighbourhoods could constitute an unobservable externality that could confound our results.

To address these concerns, we adopt an instrumental variables strategy based on a shift–share (Bartik) design, which exploits predetermined spatial exposure to tourism demand interacted with exogenous variation in global demand for short-term rental accommodation. We described this strategy in more detail in Section 2.3 below.

2.3 Bartik instrument

We instrument STR density using a shift-share design that combines predetermined spatial exposure to tourist demand with time variation in global interest in short-term rental platforms (Goldsmith-Pinkham et al., 2020). The share component captures the relative attractiveness of each civil parish to tourists prior to the expansion of STR platforms, while the shift component captures changes in worldwide demand for STR.

More specifically, the share component is the ratio between the pre-treatment number of Trip Advisor reviews for the top 10 tourist attractions (in each municipality) and their distance to the respective civil parish council building. Appendix Table A.4 shows the number of reviews for each touristic attraction. The shift component corresponds to the worldwide Google Trends searches for the term 'Airbnb', which are normalized to 100 for the week with the highest number of searches (Barron et al., 2021). We sum the yearly search counts and compute the difference between the 2019 and 2016 searches, following Garcia-López et al. (2020). Formally, the instrument is defined as:

$$Z_j = \sum_{k=1}^{10} \frac{reviews_{k,2015}}{distance_{j,k}} searches_{19\text{-}16}, \tag{3}$$

where k are the top ten tourist attractions in Lisbon and Porto, $reviews_{k,2015}$ is the number of TripAdvisor reviews in 2015 for attraction k, $distance_{j,k}$ is the distance between the civil parish j council building and attraction k, and $searches_{19\text{-}16}$ measures the change in

worldwide Google Trends searches for the term 'Airbnb' between 2016 and 2019. The top civil parish according to the index is *Santa Maria Maior* in Lisbon and the lowest is *Aldoar, Foz do Douro e Nevogilde* in Porto.

The relevance of the instrument follows from the fact that increases in global demand for short-term rentals disproportionately raise STR activity in locations with higher pre-existing tourist attractiveness. Appendix Figure A.6 shows that civil parishes with more STR density are also closer to (attractiveness-weighted) touristic amenities, while Appendix Figure A.7 shows that the same relationship holds spatially. Both provide visual evidence of a strong first-stage relationship between the instrument and STR density. Further details on the institutional context that support the first-stage relationship can be found in Appendix Section A.6.

The exclusion restriction requires that the instrument affects residents' outcomes only through its impact on STR density, i.e., the share component is exogenous in the sense of Goldsmith-Pinkham et al. (2020). This assumption is plausible in our context for two main reasons. First, the identifying variation comes from changes in global demand for short-term rentals, which are orthogonal to local shocks affecting residents' outcomes, conditional on controls. Second, the tourist attractions used to construct the shares are historical monuments and cultural landmarks that predate the study period and are unlikely to directly affect contemporary residential mobility or income dynamics. We provide evidence that residents did not seek these locations to live.[9] Figure A.3 in the Appendix shows a map of the STR density and the historical touristic amenities in the municipality. In both cases, most of the historical amenities (i.e. not correlated with today's economic activity) are in the civil parishes with the most STR density. Additionally, Appendix Figure A.4 and Appendix Figure A.5 plot the proportion of buildings classified as *Very Damaged* and the the average rent in 2011 per civil parish, respectively, in both municipalities. The civil parishes in the city centre with a higher STR density had lower rents and a higher proportion of very dam-

[9]We perform placebo tests following Barron et al. (2021) to check the exogeneity of the instrument. Details can be found in Appendix Section A.5

aged buildings in pre-treatment periods; both are signs of low attractiveness for residents. Further details on the institutional context that support the exclusion restriction of the IV can be found in Appendix Section A.7.

Under this interpretation, the shift-share instrument can be viewed as pooling multiple valid exposure-based components, each satisfying a parallel trends condition with respect to residents' outcomes. As a robustness check motivated by Borusyak et al. (2025), we assess whether identification is driven by a small subset of tourist attractions by re-estimating the IV while excluding each attraction in turn. Appendix Section A.3 shows that the estimated effects are stable across specifications, indicating that no single attraction drives the results.

Given Borusyak et al. (2025)'s advices to strengthen the exogeneity of the instrument, we control for pre-treatment trends in voter registrations and income at the local level, which helps absorb neighbourhood-level dynamics related to residential sorting or economic growth prior to the expansion of STR platforms. First, we use the pre-treatment trend in the number of registered voters per civil parish between 2013 and 2015; this measure is preferable because voter registries are continuously updated from official identity card registry data, while resident count is census-based. Both 2013 and 2015 were election years (local and legislative, respectively), ensuring the accuracy of the voter count. Second, we include the pre-treatment per capita income at the tax office level to control for the fact that attractions may impact local economic activity, and the incumbent residents' location choice, even before the arrival of tourist rental platforms.

In addition, following the diagnostic exercises recommended by Borusyak et al. (2025), we assess whether civil parishes with higher exposure differed systematically from less-exposed parishes along observable pre-treatment characteristics. Since our analysis is restricted to civil parishes within the urban cores of Lisbon and Porto, excluding suburban and peri-urban areas, baseline heterogeneity is already limited. Nonetheless, we conduct balance tests using a rich set of socioeconomic characteristics measured prior to the expansion of STR platforms. The results, reported in Appendix Section A.4, show no statistically significant differences

across exposure levels, supporting the interpretation that variation in the instrument is not driven by pre-existing differences correlated with residents' outcomes.

2.4 Heterogeneity Analysis

To shed light on the mechanisms underlying displacement and income responses, we examine heterogeneous effects by estimating equation Equation (2) separately for mutually exclusive subsamples.

Regarding mobility analysis, we begin by heterogeneity along income dimensions. On the one hand, we split households into the bottom and top quartiles and deciles of the 2016 income distribution. This allows us to assess whether touristification disproportionately affects economically vulnerable residents and the degree to which higher-income residents are shielded against it. On the other hand, we distinguish households along the extensive and intensive (i.e., below or above median) margins of property income.

Second, we tackle non-income related household and individual characteristics. We differentiate homeowners from tenants, recognizing housing tenure as a key factor shaping exposure to rising housing costs and adjustment capacity. We explore demographic heterogeneity by gender and age group, distinguishing working-age individuals from retirees (aged 65 or older), for whom both mobility costs and housing market exposure may differ substantially. We consider the individual's labour market status, i.e., we split between employed and unemployed individuals, which proxies adjustment costs to housing decisions and liquidity constraints.

When analysing the income outcomes, we are interested in the heterogeneity along the mobility margin and the housing tenure status. More specifically, we split the sample according to whether the household moved out of the municipality of residence in 2016, and further distinguish between tenants and homeowners. The objective of this analysis is to shed light on whether mobility decisions were made to accommodate arrangements that allowed households to smooth income shocks or if these shocks arise *despite* mobility decisions.

3 Results

This section presents the main empirical findings, beginning with mobility, followed by income outcomes.

3.1 Residential choice: average effects

We estimate a linear probability version of (2), in which the dependent variable is defined at the individual tax payer level and equals one if the individual's municipality of residence in 2019 differs from that in 2016, and zero otherwise. Moves within the same municipality are coded as zero. We consider two outcomes: *(i)* moving out of the initial municipality (Lisbon or Porto) and *(ii)* moving out of the corresponding metropolitan area. The results are presented in Table 2.

The IV estimates in Panel A of Table 2 imply that a one standard deviation increase in STR density leads to an increase of between 1.2 and 1.6 percentage points in the likelihood that the individual moves out of his or her initial municipality. The effect is robust to the successive inclusion of pre-shock civil-parish income and population growth, parish, household head, household, and pre-shock household income controls.

The estimates in Panel B, which shows the residential choice at the metropolitan area level, are smaller in magnitude: a one standard deviation increase in STR density leads to a 0.5 percentage points increase in the likelihood that the individual moved out of his or her initial Metropolitan Area. This is an expected result, given the larger spatial unit and higher moving costs.

Our preferred specification, reported in column (5) of Table 2, implies that a one standard deviation increase in STR density increases the likelihood that individuals move out of the two main municipalities of the country, Lisbon and Porto, by 1.3 percentage points, and an increase in 0.5 percentage points in the probability that they move out of the respective metro areas. To assess economic magnitude, note that the civil parish with the highest STR density

Table 2: Lisbon and Porto: Individual Probability of Moving Out of the Municipality and the Metropolitan Area

Panel A: 2SLS – Move Out of Municipality						
	Main Sample					Long-term Residents
	(1)	(2)	(3)	(4)	(5)	(6)
STR density	0.016***	0.015***	0.012***	0.013***	0.013***	0.012***
	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)
N	454686	454686	453582	448450	448450	371957
Adj-R^2	0.001	0.002	0.046	0.049	0.050	0.034
Montiel-Pflueger	9.463	24.608	24.615	24.682	24.694	21.509
DWH	0.006	0.010	0.022	0.018	0.014	0.000
Mean Dep. Var.	0.106	0.106	0.106	0.106	0.106	0.083
PreTrends	No	Yes	Yes	Yes	Yes	Yes
Parish Controls	No	Yes	Yes	Yes	Yes	Yes
HHHead Controls	No	No	Yes	Yes	Yes	Yes
HH controls	No	No	No	Yes	Yes	Yes
Income in 2016	No	No	No	No	Yes	Yes
Panel B: 2SLS – Move Out of Metropolitan Area						
	Main Sample					Long-term Residents
	(1)	(2)	(3)	(4)	(5)	(6)
STR density	0.005**	0.005***	0.005***	0.005***	0.005***	0.003***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
N	454686	454686	453582	448450	448450	371957
Adj-R^2	0.000	0.001	0.007	0.008	0.009	0.004
Montiel-Pflueger	9.463	24.608	24.615	24.682	24.694	21.509
DWH	0.030	0.004	0.005	0.005	0.005	0.000
Mean Dep. Var.	0.032	0.032	0.032	0.032	0.032	0.024
PreTrends	No	Yes	Yes	Yes	Yes	Yes
Parish Controls	No	Yes	Yes	Yes	Yes	Yes
HHHead Controls	No	No	Yes	Yes	Yes	Yes
HH controls	No	No	No	Yes	Yes	Yes
Income in 2016	No	No	No	No	Yes	Yes

Notes: Includes pre-treatment civil parish controls: pre-treatment per capita gross income growth (2015-2016), number of voters growth per civil parish (2013-2015), 2011 civil parish unemployment rate, 2011 civil parish percentage of adults with at least a college degree, 2011 civil parish population density; household controls: 2016 gross income, 2017 number of members, 2017 children presence, 2017 elderly presence; 2017 household head controls: gender, age, age-squared, marital status. Standard errors are clustered at the civil parish level. Montiel-Pflueger first-stage F-statistics are reported for IV specifications. Mean dependent variables at baseline are reported. Appendix Table B.2 reports the first-stage estimation. Appendix Table B.1 reports the OLS estimation of the results. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

lies 6.3 standard deviations above the mean. Therefore, the implied effect corresponds to an 8.2 percentage point increase in the probability of moving out of the municipality, when compared to residents in the mean STR density civil parish.

Column (6) presents estimates for the subsample of *long-term residents*. While the probability of leaving the municipality is comparable to the results in columns (1)–(5), the impact on leaving the metropolitan area is smaller. This is consistent with the higher regional attachment of these individuals, which may stem from long-term social or working relationships, and suggests that they are more likely to seek housing in the metropolitan area, even when they are displaced from the municipality. Full results for this subsample are reported in Appendix Table B.3.

3.2 Residential choice: heterogeneous effects

We next explore heterogeneity in individual displacement responses by estimating equation (2) separately across subsamples as described in Section 2.2. The two panels of Table 3 show the results for baseline income related heterogeneity and home occupying status, employment and demographic characteristics, respectively.

First, we examine heterogeneity by baseline household income, measured using the 2016 gross income distribution. Individuals from households in the bottom of the income distribution exhibit substantially larger displacement responses than the ones in the top quartile and decile. This pattern is consistent with affordability constraints and limited capacity to absorb housing cost increases in areas more exposed to touristification.

Second, we examine heterogeneity according to the household property income – columns (5) and (6) show no noticeable difference along this margin. Note that only 18% of the households in the sample have property income; hence it is not surprising that column (5) is comparable to the average results in Table 2. Column (6), in turn, is explained by the very low average level of property income, amounting to €1485.96 per year (over all individuals) in the intensive margin. The fact that property income shields households against displacement

Table 3: Lisbon and Porto: Individual Probability of Moving Out of the Municipality – Heterogeneity

Panel A: Move Out of Municipality – Heterogeneity Analysis								
	(1) Bottom Quartile	(2) Top Quartile	(3) Bottom Decile	(4) Top Decile	(5) No Prop. Income	(6) Property Income	(7) Below-median Property I.	(8) Above-median Property I.
STR density	0.014**	0.006**	0.011**	0.004	0.013***	0.012***	0.019***	0.004
	(0.005)	(0.002)	(0.004)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)
N	108486	113532	42850	45425	365972	82478	41097	41023
Adj-R^2	0.036	0.031	0.041	0.019	0.051	0.031	0.033	0.029
F-stat	113.633	111.034	101.863	22.853	236.404	84.093	111.582	45.507
First-Stage F-stat	21.081	37.094	25.200	39.848	23.815	29.872	29.937	30.169
Mean Dep. Var.	0.135	0.065	0.147	0.048	0.113	0.073	0.075	0.071
Base Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Panel B: Move Out of Municipality – Heterogeneity Analysis								
	(1) Homeowner	(2) Tenant	(3) Female	(4) Male	(5) Working Age	(6) Retired Age	(7) Employed	(8) Unemp.
STR density	0.012***	0.014***	0.013***	0.014***	0.012***	0.015***	0.012***	0.009*
	(0.002)	(0.004)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)
N	249084	117666	253382	195068	296370	152080	267440	21361
Adj-R^2	0.056	0.050	0.052	0.048	0.044	0.008	0.043	0.053
F-stat	206.768	136.002	306.078	181.581	269.472	33.939	301.594	148.118
First-Stage F-stat	28.914	20.076	24.265	25.242	27.008	19.046	27.089	27.766
Mean Dep. Var.	0.093	0.103	0.101	0.111	0.131	0.054	0.129	0.173
Base Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Includes pre-treatment civil parish controls: pre-treatment per capita gross income growth (2015-2016), number of voters growth per civil parish (2013-2015), 2011 civil parish unemployment rate, 2011 civil parish percentage of adults with at least a college degree, 2011 civil parish population density; household controls: 2016 gross income, 2017 number of members, 2017 children presence, 2017 elderly presence; 2017 household head controls: gender, age, age-squared, marital status. Standard errors are clustered at the civil parish level. Kleibergen-Paap first-stage F-statistic reported for the IV estimation. Mean dependent variables at baseline are reported. Appendix Table B.4 reports results for OLS estimation. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

stemming from touristification is evident when comparing the treatment effects in columns (7) and (8) – while households with below median property income (€4024,86 for those reporting property income) face the strongest displacement effects (0.019), we estimate a non-significant effect for those with property income above the median.

Third, heterogeneity by home ownership status in columns (1) and (2) of panel B shows a slightly higher probability of moving out of the municipality for tenants, compared to homeowners; note that this variable is missing for about one forth of the observations in Table 2.

Fourth, columns (3)–(6) show that heterogeneity by age group is stronger than gender differences. Retired individuals are more likely to move out than working age ones, who may face higher moving costs because of commuting. When we break down the working age population according to the labour market status, in columns (7) and (8), we find that the unemployed are less likely to move out of the municipality; this is a somewhat surprising result, albeit the coefficient is more imprecisely estimated due to the small number of observations.

All in all, the comparison of Panels A and B allow us to conclude that income is the main driver of the differential impacts on mobility caused by touristification; indeed, the average treatment effect differences between subsamples in Panel A amount to between 0.8 (between bottom and top income quartile) and 1.5 pp (for households with income above or below the median), while in Panel B the difference is at most 0.3 pp (for retired vs working age individuals).

We report the estimates for the *long-term residents* subsample in Appendix Table B.5. The results are consistent: *long-term residents* are less likely to move, and the heterogeneity goes in the same direction as for the overall sample in Table 3. This further confirms that *(i)* higher moving costs, driven by preferences or labour market attachment of *long-term residents*, and *(ii)* the importance of income as a driver of the exposure of households to touristification.

3.3 Income and work outcomes

The tourism sector is bound to generate economic gains Faber and Gaubert (2019) that can be captured by incumbent residents. We now turn to the impact of touristification on household-level income and labour-market outcomes; more specifically, we analyse the income change for the individuals that resided in the civil parish in 2016, regardless of whether they stayed or moved out. As shown, the decision to remain is affected by touristification. Therefore, the estimates by mobility status should not be interpreted as causal effects. Rather, they describe how income changes differ across realized adjustment margins. In particular, the positive income effects among homeowner stayers may reflect both genuine gains from local touristification and selection into remaining among households better able to benefit from, or withstand, the shock.

Results are reported in Table 4. Panel A shows the average results. In panel B, we use the tenure status and out-of-municipality mobility decision to split the sample into four groups, to shed light on whether mobility occurs to smooth income shocks or if these shocks arise despite mobility decisions. The baseline income levels reported in Table 4 display a clear income gradient along tenure and mobility status: homeowners have a higher income than tenants, and stayers have a higher income than movers; moreover, the only above-average income earners are the stayer homeowners.

To mitigate the influence of extreme values and measurement error in the tails of the income distribution, income outcomes are winsorised at the 1st and 99th percentiles. This approach addresses the strong right-skewness of the income distribution while retaining the full sample.

From Panel A of Table 4, we estimate an yearly gross income increase of €730.85 for each standard deviation increase in the touristification measure. When comparing to the baseline annual gross income in 2016 this represents a 2.77% increase with respect to the average (€26293.18). In the most touristic civil parish of Lisbon this amounts to €4662.82 per year, which would correspond to 17.73% of the average baseline annual gross income. Panels B to

Table 4: Household Income and Work Outcomes

	2SLS estimation of Income and Work Outcomes										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Int. margin (2019-16)		**Int. margin (2019-17)**						**Ext. margin (2019-17)**		
	Δ Gross	**Δ Net**	**Δ Gross**	**Δ Net**	**Δ Labour**	**Δ Wage**	**Δ Self-empl**	**Δ Property**	**Δ Labour**	**Δ Wage**	**Δ Self-empl**
						Panel A: Total					
STR density	730.848*	471.591*	483.668*	302.537*	295.452*	282.848*	9.745	40.332*	0.002*	0.003***	-0.002**
	(322.626)	(214.088)	(233.117)	(149.343)	(135.672)	(121.986)	(14.114)	(15.804)	(0.001)	(0.001)	(0.001)
N	330430	330430	330430	330430	330430	330430	330430	330430	330430	330430	330430
Adj-R^2	0.072	0.089	0.059	0.064	0.053	0.061	0.001	0.010	0.112	0.085	0.000
Montiel-Pflueger	24.464	24.464	24.464	24.464	24.464	24.464	24.464	24.464	24.464	24.464	24.464
Mean Dep. Var.	26293.18	21010.03	27209.88	21641.40	26417.61	24408.53	2009.08	1287.79	0.931	0.887	0.151
						Panel B: Homeowners in 2016 & Stayers					
STR density	1194.087**	760.498**	786.609*	485.384*	496.729**	450.699**	34.424*	73.089***	0.002	0.003**	-0.001
	(409.925)	(267.833)	(313.247)	(201.151)	(182.599)	(172.587)	(15.709)	(21.467)	(0.001)	(0.001)	(0.001)
N	160348	160348	160348	160348	160348	160348	160348	160348	160348	160348	160348
Adj-R^2	0.070	0.089	0.052	0.058	0.051	0.058	0.002	0.009	0.105	0.086	0.000
Montiel-Pflueger	28.652	28.652	28.652	28.652	28.652	28.652	29.652	28.652	28.652	28.652	28.652
Mean Dep. Var.	34718.34	26941.33	35776.88	27628.12	34457.36	32047.78	2409.58	1901.97	0.938	0.899	0.163
						Panel C: Homeowners in 2016 & Movers					
STR density	346.614	156.564	-4.594	-96.284	-309.207**	-186.723	-52.716	68.968***	-0.007**	-0.001	-0.011
	(245.714)	(160.911)	(153.994)	(93.725)	(116.342)	(102.469)	(42.937)	(18.883)	(0.002)	(0.003)	(0.007)
N	17189	17189	17189	17189	17189	17189	17189	17189	17189	17189	17189
Adj-R^2	0.069	0.095	0.035	0.042	0.049	0.051	0.001	0.006	0.106	0.096	0.000
Montiel-Pflueger	29.147	29.147	29.147	29.147	29.147	29.147	29.147	29.147	29.147	29.147	29.147
Mean Dep. Var.	22965.32	18788.83	24294.90	19772.88	23535.89	21589.14	1946.74	920.72	0.916	0.861	0.186
						Panel D: Tenants in 2016 & Stayers					
STR density	152.933	93.677	130.330	84.036	149.283	131.812	2.910	–	0.002	0.003*	-0.001
	(182.299)	(131.753)	(125.196)	(89.293)	(103.857)	(83.907)	(10.054)	–	(0.001)	(0.001)	(0.001)
N	81044	81044	81044	81044	81044	81044	81044	–	81044	81044	81044
Adj-R^2	0.081	0.094	0.076	0.079	0.064	0.073	0.000	–	0.138	0.101	0.001
Montiel-Pflueger	20.121	20.121	20.121	20.121	20.121	20.121	20.121	–	20.121	20.121	20.121
Mean Dep. Var.	17063.54	14687.72	17437.10	14990.30	17391.06	16225.26	1165.80	–	0.938	0.905	0.107
						Panel E: Tenants in 2016 & Movers					
STR density	139.660	72.231	142.975	111.411	10.909	52.282	-44.232	–	0.003	0.004	-0.005
	(167.212)	(123.938)	(119.704)	(87.926)	(99.998)	(90.150)	(38.725)	–	0.003	(0.003)	(0.006)
N	9475	9475	9475	9475	9475	9475	9475	–	9475	9475	9475
Adj-R^2	0.069	0.083	0.049	0.052	0.048	0.053	-0.001	–	0.116	0.106	-0.000
Montiel-Pflueger	22.415	22.415	22.415	22.415	22.415	22.415	22.415	–	22.415	22.415	22.415
Mean Dep. Var.	16409.18	14190.21	17160.96	14789.40	17111.99	15704.96	1407.03	–	0.924	0.879	0.146
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Includes pre-treatment civil parish controls: pre-treatment per capita gross income growth (2015-2016), number of voters growth per civil parish (2013-2015), 2011 civil parish unemployment rate, 2011 civil parish percentage of adults with at least a college degree, 2011 civil parish population density; household controls: 2016 gross income, 2017 number of members, 2017 children presence, 2017 elderly presence; 2017 household head controls: gender, age, age-squared, marital status. Standard errors are clustered at the civil parish level. Outcomes are winsorized at the 1st and 99th percentiles within each estimation sample. Montiel-Pflueger first-stage F-statistics are reported for IV specifications. Mean dependent variables at baseline are reported. Appendix Table B.7 reports first-stage regression results. Appendix Table B.6 reports OLS estimation. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

E of Table 4 show that these income gains are concentrated amongst homeowners (in 2016) who stayed in the municipality.

Analysing across income sources in columns (3) to (8), we conclude that the income increase is supported by the growth in both labour income (specifically employment income) and property income. Zooming in on homeowner stayers, in Panel B, the treatment effect is positive in all income sources. On the contrary, homeowner movers have a labour income decrease, only partially compensated by an increase in property income. This suggests a negative labour market impact of the (endogenous) mobility.

A one standard deviation increase in the shock increases the probability of becoming employed by 0.3 percentage points and reduces the probability of becoming self-employed by 0.2 percentage points. Although these effects are small in absolute terms, their magnitude becomes more noticeable in highly exposed areas. For instance, in the civil parish with the highest STR exposure (6.3 standard deviations above the mean), the implied effect corresponds to an increase of approximately 1.9 percentage points in the probability of employment and a decrease of about 1.3 percentage points in the probability of self-employment. Relative to the baseline employment and self-employment rates of 88.7% and 15.1%, respectively, these changes represent modest but economically meaningful adjustments in labour market outcomes.

Regarding the extensive margin, in columns (9)–(11), our results show employment and self-employment impacts in opposite directions. A one standard deviation increase in the shock increases the probability of becoming employed by 0.3 percentage points and reduces the probability of becoming self-employed by 0.2 percentage points. Although these effects are small in absolute terms, their magnitude becomes more noticeable in highly exposed areas. For instance, in the civil parish with the highest STR exposure (6.3 standard deviations above the mean), the implied effect corresponds to an increase of approximately 1.9 percentage points in the probability of employment and a decrease of about 1.3 percentage points in the probability of self-employment. Relative to the baseline employment and

self-employment rates of 88.7% and 15.1%, respectively, these changes represent modest but economically meaningful adjustments in labour market outcomes. Panels B to E show a positive treatment effect on the wage income of stayer homeowners and a negative one on movers, reinforcing the message that mobility comes at the cost of less advantageous labour market outcomes. We further estimate a positive impact on wage income of stayer tenants, at the extensive margin, that we do not consider a very strong result, given that all other estimated treatment effects on income are non-significant. Overall, the income gains associated with touristification appear to accrue primarily to incumbent homeowners rather than to tenants.

Appendix Table B.8 reports corresponding estimates for the *long-term residents* subsample. The main patterns are similar: income gains are concentrated among homeowners who remain in the municipality, while tenants exhibit limited evidence of benefits. Among long-term resident homeowners who move out, we observe declines in labour income with weaker evidence of compensating increases in property income.

3.4 Discussion: Unequal Incidence and Adjustment to Touristification

The previous results reveal a seemingly contrasting pattern: touristification simultaneously increases displacement and raises income. In this subsection, we jointly interpret these findings to shed light on the heterogeneous incidence of tourism-driven housing shocks.

Touristification causes a sizeable mobility of incumbent residents even in the short period of time that we analyse. Comparing the most touristified civil parish of Lisbon with the average one, according to our preferred specification in Table 2, iplying that touristification accounts for 77% ($(0.013 \times 6.3)/0.106$) of the 10.6% of residents who quit the municipality and 98.4% of the 3.2% of residents who move out of the metropolitan area. The results are equally sizeable for the long-term residents' sample: touristification explains 91.1% of the 8.3% who move out of the municipality, and 78.8% of the 2.4% who move out of the

Table 5: Where do movers go?

	(1) Above-Median Municipality Income	(2) Distance of destination Municipality	(3) Moved to Lower Average Rent Municipality
	Panel A: Total		
STR density	-0.004**	1.995*	-0.003
	(0.002)	(1.012)	(0.010)
N	45821	46056	46962
Adj-R^2	0.022	0.007	0.145
Montiel-Pflueger	26.429	26.364	26.475
Controls	Yes	Yes	Yes
Mean Dep. Var.	0.939	62.251	0.778
	Panel B: Homeowners in 2016		
STR density	-0.003	2.111	-0.001
	(0.002)	(1.592)	(0.011)
N	22511	22568	22923
Adj-R^2	0.026	0.010	0.156
Montiel-Pflueger	29.349	29.421	29.476
Controls	Yes	Yes	Yes
Mean Dep. Var.	0.935	65.774	0.771
	Panel C: Tenants in 2016		
STR density	-0.005*	3.335	-0.002
	(0.003)	(2.996)	(0.013)
N	11683	11772	11996
Adj-R^2	0.020	0.007	0.141
Montiel-Pflueger	22.100	22.058	22.150
Controls	Yes	Yes	Yes
Mean Dep. Var.	0.950	53.092	0.800

Notes: Indicator for above-median are defined relative to the cross-sectional distribution of municipalities from the Personal Income Tax records. Distance of the destination municipality is in kilometres with respect to the centre of the origin municipality computed from georeferenced administrative boundaries. Average rent in the municipality is obtained from the 2021 Census. Includes pre-treatment civil parish controls: pre-treatment per capita gross income growth (2015-2016), number of voters growth per civil parish (2013-2015), 2011 civil parish unemployment rate, 2011 civil parish percentage of adults with at least a college degree, 2011 civil parish population density; household controls: 2016 gross income, 2017 number of members, 2017 children presence, 2017 elderly presence; 2017 household head controls: gender, age, age-squared, marital status. Standard errors are clustered at the civil parish level. Montiel-Pflueger first-stage F-statistics are reported for IV specifications. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

metropolitan area.

The fact that the individuals are displaced, per se, does not imply that they are priced out of their original residence. They could move because of preferences related to congestion or because they reap economic benefits from the touristic activities. Our results show that the two mechanisms co-exist, for different parts of the population.

The results can be divided as follows. First, individuals of the top decile of gross income or with above median property income are not displaced by touristification (Table 3). Second, we estimate quite different income shocks depending on home ownership status and mobility decisions. Homeowners who decide to stay in the municipality enjoy a strong positive income shock, while those who move lose labour income, partially compensated by higher property income. Importantly, the mobility decision is endogenous. What our results allow us to conclude is that there is a subset of homeowners who are able to remain in the touristified areas and enjoy economic benefits of the touristified city. Tenants, by contrast, do not enjoy any income gains, even when they move – a result which is consistent with being priced out. As a general rule, movers experience weaker labour outcomes, which suggests that they are constrained to move. Lastly, we present a final piece of evidence that reinforces these conclusions, by examining the characteristics of the destinations municipalities of the movers.

Table 5 reports, conditional on moving, a set of outcomes capturing the characteristics of destination municipalities. Specifically, we consider indicators of whether the per capita gross income at the destination municipality is above the median of municipalities and whether the destination municipality has lower average monthly rents than the origin municipality, as well as the distance in kilometres of the destination municipality to the origin municipality.

We find that movers from more touristified civil parishes are more likely to move to destination municipalities that are poorer and further away from the origin than the ones from less touristified civil parishes. Specifically, residents from the most touristified civil parish of Lisbon move 12.6 km further than the ones in the average civil parish, which

explains 20% of the mean distance. These results reinforce the conclusion that individuals are constrained to move to these locations.

When we split the sample between homeowners and tenants, the estimates are statistically imprecise, possibly due to the small samples. Nevertheless, the point estimates suggest that tenants in the most affected areas move further away, and are less likely to move to higher-income municipalities, than their homeowner counterparts. Albeit non-significant, the magnitude of the coefficient for the mobility distance of tenants implies that those who live in the most touristified municipality move 21 km further than the ones residing in the average one, which amounts to 40% of the mean distance. While these findings have to be taken with a grain of salt, they are still suggestive of home ownership serving as a shielding mechanism against the touristification shock.

The results for the average rent of the destination municipalities are imprecisely estimated and small in magnitude for both the full mover sample and the two subsamples.

4 Conclusion

This paper uses rich administrative tax microdata for Lisbon and Porto to study how the rapid expansion of short-term rental (STR) platforms affects incumbent residents in large urban centres. We instrument civil-parish level STR density with pre-existing tourist attractiveness and global demand for STR accommodation to estimate the causal effects of STR expansion on residential mobility and economic outcomes for incumbent residents.

Our results show that touristification has strong asymmetric effects on the incumbent residents. Displacement is concentrated in individuals who do not own their house, are poorer, and do not have property income, who move to further and lower-income municipalities. The strongest and most robust income gains accrue to homeowners who remain in the origin municipality.

These patterns are consistent with housing markets transmitting tourism shocks unevenly

across households depending on their exposure to housing wealth and local economic opportunities. From a policy perspective, these findings highlight the importance of considering distributional impacts when regulating short-term rental markets, and tourism-promoting policies more generally. Policies aimed at expanding housing supply or providing targeted support to vulnerable households may help mitigate displacement pressures while preserving the economic benefits associated with tourism (Azevedo et al., 2025). These dynamics may be particularly pronounced in cities where housing supply is relatively inelastic, as tourism-driven demand shocks are more likely to translate into rising housing pressure and displacement rather than new residential construction.

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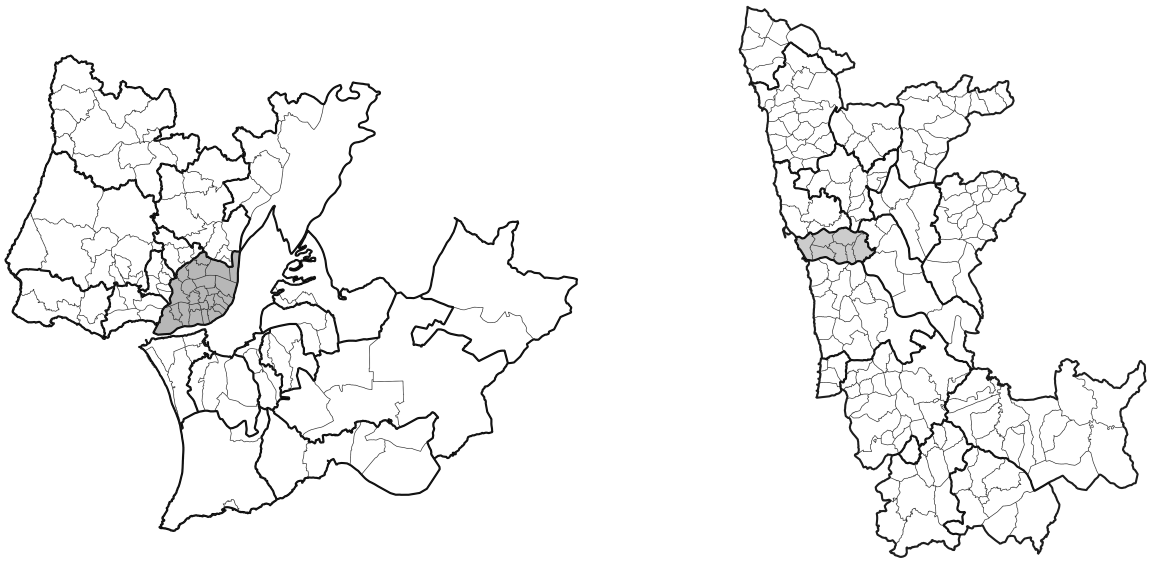
Appendices

A Context, data and methodology

A.1 Context

Figure A.1: Maps of the Metropolitan Areas of Lisbon and Porto

(a) Lisbon M.A. (b) Porto M.A.



Notes: The maps show the metropolitan areas of Lisbon (left) and Porto (right) with the respective subdivisions of municipalities and civil parishes. The central municipalities of Lisbon and Porto are highlighted in grey.

Table A.1: Lisbon tax offices and civil parishes correspondence.

Tax office	**Civil parish**	**Nr. of households**	**% of earnings of the office**
PENHA DE FRANÇA	AREEIRO	12611	45.5
PENHA DE FRANÇA	PENHA DE FRANÇA	17811	36.9
PENHA DE FRANÇA	SÃO VICENTE	8508	17.6
LUMIAR	LUMIAR	24042	82.2
LUMIAR	SANTA CLARA	10436	17.8
SANTO ANTÓNIO	CAMPO DE OURIQUE	13158	60.5
SANTO ANTÓNIO	SANTO ANTÓNIO	8301	39.5
SANTA MARIA MAIOR	MISERICÓRDIA	7355	41.9
SANTA MARIA MAIOR	SANTA MARIA MAIOR	34935	58.1
ARROIOS	ARROIOS	23465	39.7
ARROIOS	CAMPOLIDE	8262	16.9
ARROIOS	AVENIDAS NOVAS	14884	43.4
BENFICA	BENFICA	21116	35.3
BENFICA	CARNIDE	9557	18.7
BENFICA	S. DOMINGOS DE BENFICA	19494	46.0
OLIVAIS	OLIVAIS	20305	54.7
OLIVAIS	PARQUE DAS NAÇÕES	8770	45.3
BELÉM	AJUDA	8404	15.0
BELÉM	ALCANTARA	8180	16.8
BELÉM	BELÉM	9011	33.7
BELÉM	ESTRELA	11620	34.5
ALVALADE	ALVALADE	19314	100.0
MARVILA	BEATO	7023	30.8
MARVILA	MARVILA	18519	69.2

Notes: Number of households per civil parish. Earnings of each civil parish as a percentage of the total earnings of the tax office which it belongs to. Source: Autoridade Tributária e Aduaneira and Instituto Nacional de Estatística.

A.2 Data

Table A.2: Distance (in a straight-line) from the Civil Parish Centroid to the City Centre (Town-Hall)

Freguesia	**Distance_km**
Ajuda	5.245
Alcantara	3.902
Alvalade	5.119
Areeiro	3.710
Arroios	2.161
Avenidas Novas	3.463
Beato	3.546
Belem	6.622
Benfica	6.002
Campo de Ourique	2.629
Campolide	3.568
Carnide	7.589
Estrela	2.220
Lumiar	7.174
Marvila	5.023
Misericordia	0.769
Olivais	7.080
Parque das Nacoes	8.289
Penha de Franca	2.560
Santa Clara	8.626
Santa Maria Maior	0.536
Santo Antonio	1.710
Sao Domingos de Benfica	5.371
Sao Vicente	1.725
Bonfim	1.241
Campanha	3.071
Paranhos	2.758
Ramalde	3.606
U.F. Aldoar, Foz do Douro e Nevogilde	5.352
U.F. Cedofeita, Santo Ildefonso, Se, Miragaia, Sao Nicolau e Vitoria	0.600
U.F. Lordelo do Ouro e Massarelos	2.895

Table A.3: Descriptive Statistics for the *long-term residents* subsample

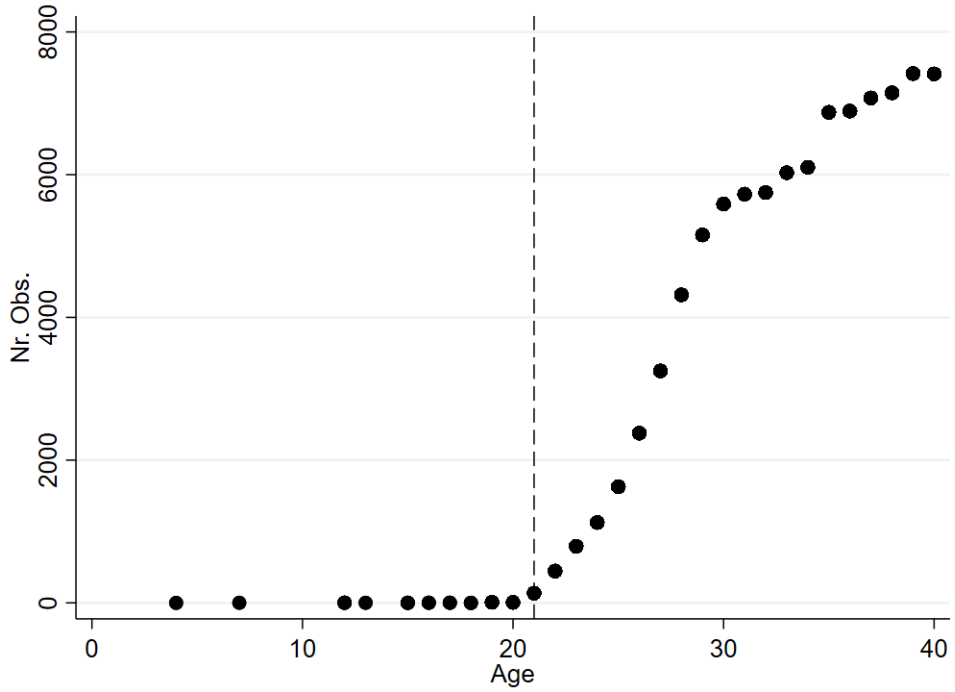
Variable	**Obs.**	**Mean**	**Std. Dev.**
STR density	376,812	-0.012	0.992
Amenities SSIV	376,812	19,811,878.629	11,384,393.129
Move Out of CivilParish	376,827	0.185	0.388
Move Out of Municipality	376,827	0.083	0.276
Move Out of Metropolitan Area	376,827	0.024	0.154
Gross Income in 2016	376,827	30,388.021	43,996.204
Gross Income Difference	376,827	6,667.267	40,003.813
Net Income Difference	376,827	5,065.281	21,950.028
Labour Income Difference	376,827	2,934.271	24,989.237
Wage Income Difference	376,827	3,059.564	23,442.634
Self-employed Income Difference	376,383	-125.441	9,371.835
Property Income Difference	376,827	350.449	3,786.811
Labour Status Difference	376,827	0.047	0.247
Employed Status Difference	376,827	0.054	0.274
Self-employed Status Difference	376,827	-0.007	0.260
Pre-analysis Growth Per Capita	376,812	1.602	0.716
Pre-analysis Voter Growth	376,827	-0.010	0.011
Population Density in 2011	376,812	6,622.117	2,783.532
Unemployment Rate in 2011	376,812	6.280	1.609
% of College Educated over 25 in 2011	376,812	32.285	11.923
Nr. of Household Members	371,972	0.949	1.058
Children Presence	371,972	0.265	0.441
Elderly Presence	371,972	0.002	0.048
Age	375,940	58.793	16.972
Female	375,940	0.572	0.495
Single	371,972	0.353	0.478
Married	371,972	0.543	0.498
Tenure Status	376,827	0.882	0.653

Table A.4: Top 10 tourist attractions in Lisbon and Porto

Lisbon		Porto	
Touristic Attraction	Nr Reviews	Touristic Attraction	Nr. Reviews
Oceanário	14,221	Zona Ribeirinha	6,355
Torre de Belém	12,371	Ponte de D. Luis	5,851
Castelo de São Jorge	8,179	Torre dos Clérigos	2,742
Mosteiro dos Jerónimos	7,299	Livraria Lello	2,110
Alfama	6,227	Palácio da Bolsa	1,581
Bairro alto	5,168	Sé Catedral	1,416
Museu Fundação Calouste Gulbenkian	4,320	Rua de Santa Catarina	1,199
Chiado	3,764	Igreja de S. Francisco	1,143
Praça do Comércio	3,130	Fundação Serralves	1,079
Arco da Rua Augusta	2,250	Casa da Música	990

Note: The table presents the name of the top 10 tourist attractions in Lisbon and Porto and the corresponding number of TripAdvisor reviews in 2015.

Figure A.2: Distribution of observations around 21 years old

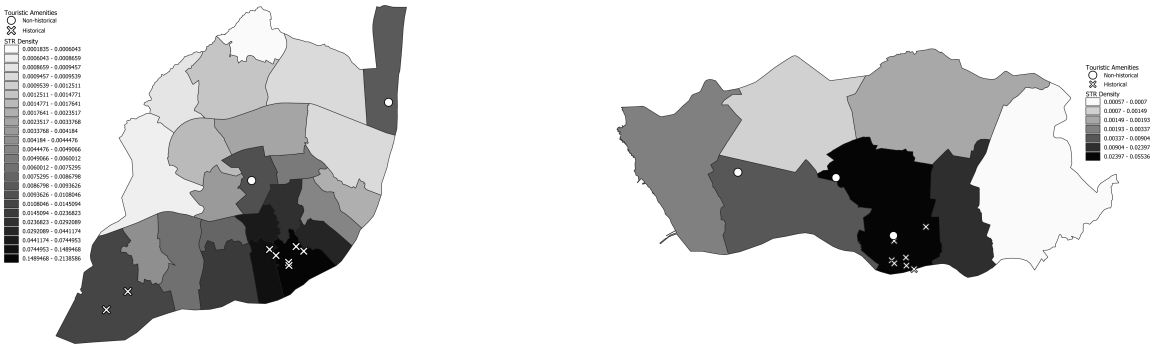


Notes: Figure shows a scatter plot of the number of individuals in the sample with Employed income or Self-employed income by age.

Figure A.3: STR Density and touristic amenities in Lisbon and Porto in 2016

(a) Lisbon Municipality

(b) Porto Municipality



Note: The maps show the civil parishes of the municipalities of Lisbon (left) and Porto (right) according to the STR Density (darker colours mean higher density) and the top 10 touristic amenities locations marked (either historical and non-historical amenities).

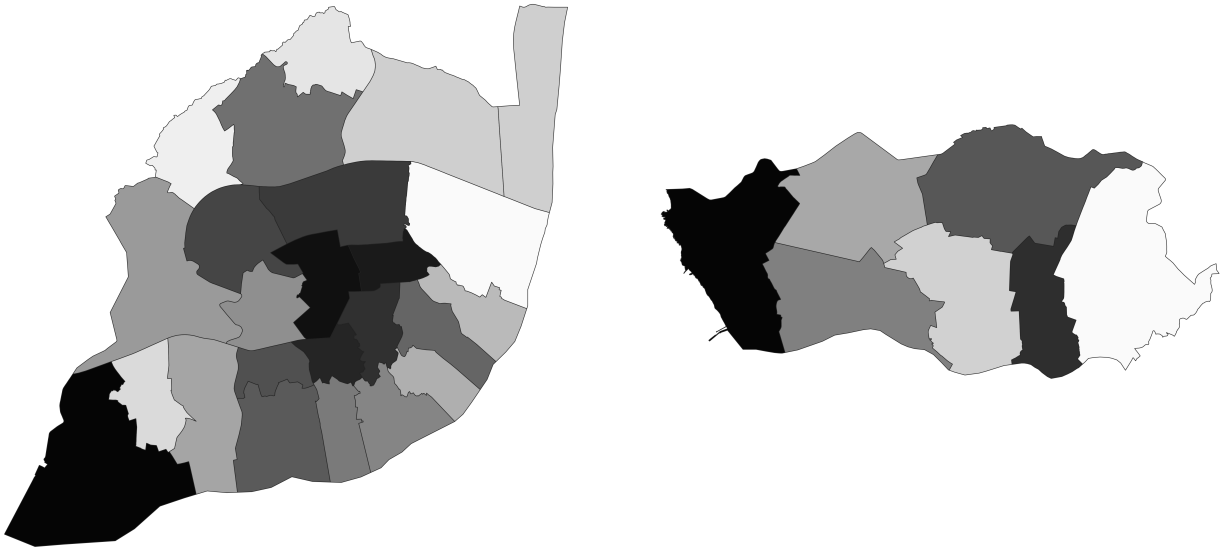
Figure A.4: Proportion of Very Damaged Building in Lisbon and Porto in 2011

(a) Lisbon Municipality (b) Porto Municipality

Note: The maps show the civil parishes of the municipalities of Lisbon (left) and Porto (right) according to the proportion of buildings classified as 'Very Damaged' over the number of buildings according to the 2011 Census. Darker (resp., lighter) colours mean larger (resp., smaller) proportion of damaged buildings.

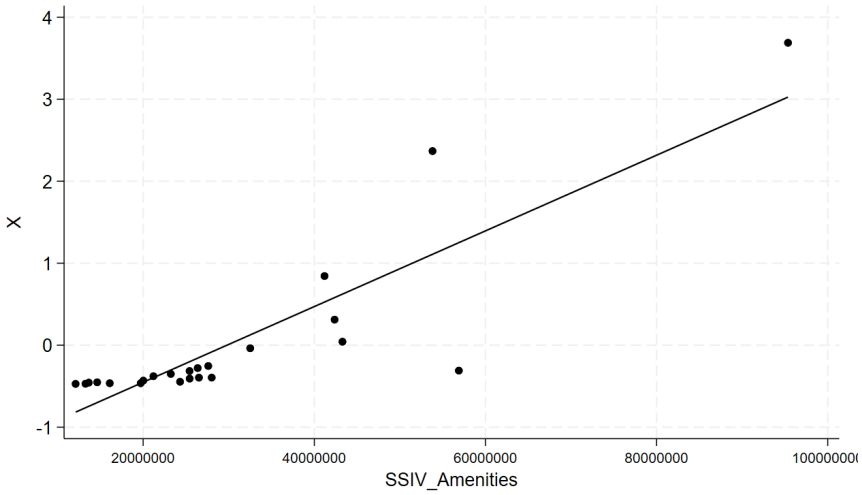
Figure A.5: Average Rent Price in Lisbon and Porto in 2011

(a) Lisbon Municipality (b) Porto Municipality



Note: The maps show the average rent price per civil parishes of the municipalities of Lisbon (left) and Porto (right) according to the 2011 Census. Darker colours mean higher price, lighter colours indicates lower prices.

Figure A.6: Instrument relevance: relationship between STR density and the shift-share instrument.



Note: The figure illustrates the relationship between the instrumental variable and STR density at the civil parish level. Each marker corresponds to one civil parish and provides visual evidence of first-stage relevance.

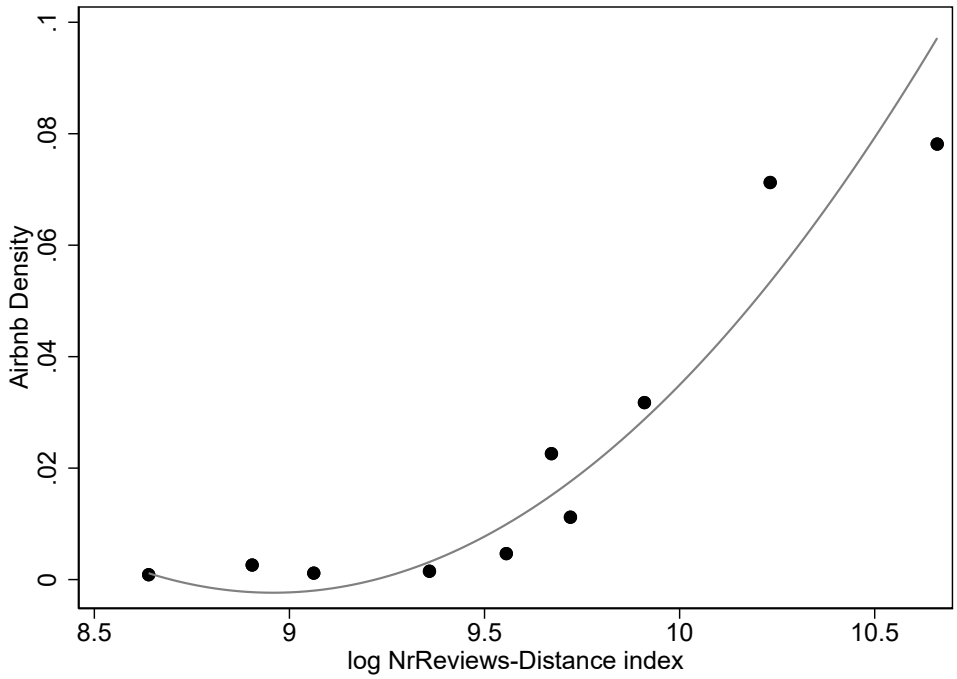
Figure A.7: Instrument relevance: spatial overlapping between STR density and the shift–share instrument.

(a) STR density

(b) Instrumental Variable

Note: The figure illustrates the spatial overlapping between the STR density (left) and the instrumental variable (right). Darker (resp., lighter) colours mean higher (resp., lower) values of STR density or IV.

Figure A.8: STR Density and Touristic Amenities



Note: The figure plots STR density by deciles of the amenities-based exposure measure (i.e. the number of reviews over the distance to the municipal council building). Civil parishes with greater exposure to tourist amenities exhibit systematically higher STR activity, consistent with the relevance of the share component.

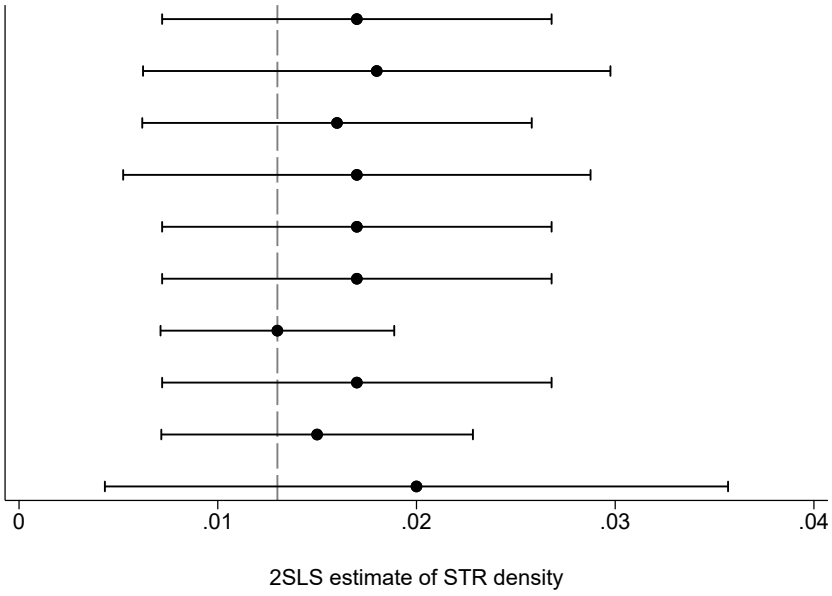
A.3 Leave-one-out Instrument Test

Motivated by the diagnostics for shift–share instruments discussed in Borusyak et al. (2025), we assess whether our IV estimates are driven by a small subset of tourist attractions. We do so by reconstructing the shift–share instrument while excluding one attraction at a time. Specifically, for each attraction k, we define an alternative instrument $Z_j^{(-k)}$ as in equation Equation (4), which removes attraction k from the share component while leaving all other elements unchanged. We then re-estimate the main 2SLS specification using each alternative instrument.

$$Z_j^{(-k)} = \sum_{\ell \neq k} \frac{reviews_{\ell,2015}}{distance_{j,\ell}} \cdot searches_{\text{19-16}}, \tag{4}$$

Figure A.9 plots the resulting coefficient estimates and 95% confidence intervals. The estimates are similar in magnitude across all leave-one-out specifications and remain close to the baseline estimate, indicating that the results are not driven by any single tourist attraction.

Figure A.9: Coefficients of the 2SLS estimation using each leave-one-out instrument



Note: The plot shows estimated coefficient of the main regression and the respective 95% confidence interval, using each leave-one-out instrument. The dashed horizontal line represents the main coefficient using the original instrument.

A.4 Balance Tests - Highly vs low treated civil parishes

Table A.5 reports balance tests comparing high- and low-treated civil parishes across a broad set of pre-treatment characteristics drawn from the 2011 Census. The variables include shares of population that completed high school, share of population that completed university, population density, unemployment rate, and share of individuals aged 65 or older. Consistent with the identifying assumptions of the shift-share design, we find no statistically significant differences between groups for any of the variables considered. These results suggest that differential exposure is unlikely to be driven by pre-existing socioeconomic or housing market conditions.

Table A.5: Lisbon and Porto: Individual Probability of Moving Out of the Municipality and Metropolitan Area

	Low treated	Highly Treated	Difference (Low–High)
Completed high school (%)	41.363	39.818	1.545
	(10.851)	(7.491)	(5.113)
Completed university (%)	32.351	28.094	4.257
	(12.271)	(8.408)	(5.779)
Population density (Nr./km^2)	6540.694	6622.861	-82.167
	(3180.486)	(1498.925)	(1468.991)
Unemployment rate (%)	6.100	6.746	-0.645
	(1.593)	(1.285)	(0.761)
Share aged 65+ (%)	23.833	25.514	-1.681
	(4.289)	(1.826)	(1.974)

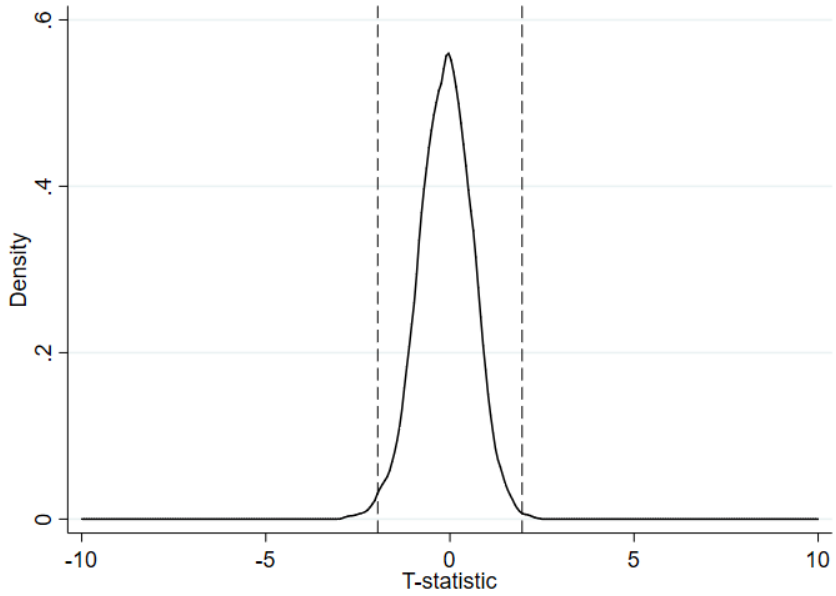
Notes: This table presents a set of balance tests for socioeconomic measures from Census 2011. The classification of high and low treated parishes was based on the measure of STR Density. Civil parishes are classified as highly treated if their exposure lies above the first major discontinuity in the distribution. Those, also account for the majority of total exposure (above 50%) This criteria identifies five civil parishes with markedly higher exposure than the remainder (the balance tests are robust to different divisions). Hence, the highly treated civil parishes are Santa Maria Maior, Misericórdia, São Vicente, Santo António, and União das freguesias de Cedofeita, Santo Ildefonso, Sé, Miragaia, São Nicolau e Vitória (Porto).

A.5 Placebo test

We follow the approach of Christian and Barrett (2017) and Barron et al. (2021) to conduct placebo tests. The test is aimed at excluding the possibility of a confounding trend that could undermine the exogeneity of the instrument. We randomize the STR density across civil parishes in order to change the allocation of the treatment in different civil parishes while keeping the overall time trends. In case our results were driven by a spurious trend, the tests should yield positive and statistically significant results, alike our main results. Figure A.10 shows the distribution of the estimated t-statistics for the effect on our main outcome variable.

We estimate the IV specification on the dataset for a 1000 random allocations of STR density among civil parishes. The measured effect does not yield a statistically significant result for 99% of the randomized allocations.

Figure A.10: Placebo Tests. 1000 Randomizations.



Note: The figure shows the distribution of estimated t-statistics for the effect of the treatment on the main outcome variable. Vertical dashed lines identify the -1.96 and 1.96 critical values. Only 10 of the 1000 randomized estimates yield statistically significant results at the 5% level.

A.6 Institutional evidence of the relevance restriction

We rely on two surveys to claim that *(i)* monuments are a top reason for visiting Lisbon, and *(ii)* tourists chose their accommodation locations accordingly. A 2017 survey by the Portuguese Tourism Observatory cited in CML (2018) found that 86.9% of tourists visited Lisbon to enjoy food and wine, 86.3% of visitors wanted to visit monuments, 73.5% visited for the city's atmosphere and scenery, and 71.9% were interested in Portuguese culture. This confirms the strong preference of the tourists for top attractions, which rank second in their reasons to visit the city. Moreover, of the 2024 Motivational Survey by the Lisbon Tourism Observatory, which interviewed 8,551 tourists, including 8,437 foreign visitors, the vast majority expressed a strong preference for visiting monuments and museums. Among international tourists, 92.8% visited Lisbon with the goal of exploring monuments and museums, while 92.5% came to enjoy the local gastronomy and wines. Furthermore, 54.7% wanted to appreciate Lisbon's atmosphere and landscape (de Lisboa, 2024).

A.7 Institutional evidence of the exclusion restriction

Further institutional evidence indicates that STR expansion concentrated in historical neighborhoods characterized by population decline, aging residents, and poor housing conditions prior to the diffusion of short-term rental platforms. Of the 14,461 STR units registered by 2018, around 65.3% were located in the historical civil parishes of Santa Maria Maior, Misericórdia, Arroios, and Santo António — neighbourhoods, previously marked by population decline, ageing residents, and widespread building deterioration (CML, 2018). A similar pattern is obverved in Porto, where 71% of STR listings in 2018 were located in the civil parishes that had suffered from depopulation, insecurity, and vacant or decaying buildings (Castro et al., 2019), i.e., União de Freguesias de Cedofeita, Santo Ildefonso, Sé, Miragaia, São Nicolau, and Vitória.

B Robustness

Table B.1: Lisbon and Porto: Individual Probability of Moving Out of the Municipality and Metropolitan Area

Panel A: OLS – Move Out of Municipality					
	(1)	(2)	(3)	(4)	(5)
STR density	0.011***	0.010***	0.008***	0.008***	0.009***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
N	458309	458309	457205	452034	420242
Adj-R^2	0.001	0.002	0.046	0.049	0.049
F-stat	12.405	14.242	189.071	199.930	329.736
Mean Dep. Var.	0.106	0.106	0.106	0.106	0.106
PreGrowth	No	Yes	Yes	Yes	Yes
Parish Controls	No	Yes	Yes	Yes	Yes
HHHead Controls	No	No	Yes	Yes	Yes
HH controls	No	No	No	Yes	Yes
Income in 2016	No	No	No	No	Yes
Panel B: OLS – Move Out of Metropolitan Area					
	(1)	(2)	(3)	(4)	(5)
STR density	0.003**	0.003***	0.003***	0.003***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
N	458309	458309	457205	452034	420242
Adj-R^2	0.000	0.001	0.007	0.009	0.007
F-stat	8.297	7.678	58.516	73.727	85.907
Mean Dep. Var.	0.032	0.032	0.032	0.032	0.032
PreGrowth	No	Yes	Yes	Yes	Yes
Parish Controls	No	Yes	Yes	Yes	Yes
HHHead Controls	No	No	Yes	Yes	Yes
HH controls	No	No	No	Yes	Yes
Income in 2016	No	No	No	No	Yes

Notes: Includes pre-treatment civil parish controls: pre-treatment per capita gross income growth (2015-2016), number of voters growth per civil parish (2013-2015), 2011 civil parish unemployment rate, 2011 civil parish percentage of adults with at least a college degree, 2011 civil parish population density; household controls: 2016 gross income, 2017 number of members, 2017 children presence, 2017 elderly presence; 2017 household head controls: gender, age, age-squared, marital status. Standard errors are clustered at the civil parish level. Mean dependent variables at baseline are reported. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table B.2: First-Stage of Table 2

Panel A: First-Stage – Move Out of Municipality	
STR density	(1)
SSIV Amenities	0.058***
	(0.012)
N	448450
Controls	Yes
Panel B: First-Stage – Move Out of Metropolitan Area	
STR density	(1)
SSIV Amenities	0.058***
	(0.012)
N	448450
Controls	Yes

Notes: Includes pre-treatment civil parish controls: pre-treatment per capita gross income growth (2015-2016), number of voters growth per civil parish (2013-2015), 2011 civil parish unemployment rate, 2011 civil parish percentage of adults with at least a college degree, 2011 civil parish population density; household controls: 2016 gross income, 2017 number of members, 2017 children presence, 2017 elderly presence; 2017 household head controls: gender, age, age-squared, marital status. Standard errors are clustered at the civil parish level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table B.3: Lisbon and Porto: Individual Probability of Moving Out of the Municipality and Metropolitan Area (*long-term residents*)

Panel A: 2SLS – Move Out of Municipality					
	(1)	(2)	(3)	(4)	(5)
STR density	0.014***	0.012***	0.011***	0.011***	0.012***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
N	376812	376812	375925	371957	371957
Adj-R^2	0.001	0.002	0.030	0.033	0.034
F-stat	9.548	23.799	133.097	257.340	355.708
Montiel-Pflueger	11.623	21.423	21.429	21.490	21.509
DWH	0.000	0.000	0.000	0.000	0.000
Mean Dep. Var.	0.083	0.083	0.083	0.083	0.083
PreTrends	No	Yes	Yes	Yes	Yes
Parish Controls	No	Yes	Yes	Yes	Yes
HHHead Controls	No	No	Yes	Yes	Yes
HH controls	No	No	No	Yes	Yes
Income in 2016	No	No	No	No	Yes
Panel B: 2SLS – Move Out of Metropolitan Area					
	(1)	(2)	(3)	(4)	(5)
STR density	0.004***	0.003***	0.003***	0.003***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
N	376812	376812	375925	371957	371957
Adj-R^2	0.000	0.001	0.003	0.004	0.004
F-stat	12.620	15.016	34.621	70.246	68.487
Montiel-Pflueger	11.623	21.423	21.429	21.490	21.509
DWH	0.000	0.000	0.000	0.000	0.000
Mean Dep. Var.	0.024	0.024	0.024	0.024	0.024
PreTrends	No	Yes	Yes	Yes	Yes
Parish Controls	No	Yes	Yes	Yes	Yes
HHHead Controls	No	No	Yes	Yes	Yes
HH controls	No	No	No	Yes	Yes
Income in 2016	No	No	No	No	Yes

Notes: Includes pre-treatment civil parish controls: pre-treatment per capita gross income growth (2015-2016), number of voters growth per civil parish (2013-2015), 2011 civil parish unemployment rate, 2011 civil parish percentage of adults with at least a college degree, 2011 civil parish population density; household controls: 2016 gross income, 2017 number of members, 2017 children presence, 2017 elderly presence; 2017 household head controls: gender, age, age-squared, marital status. Standard errors are clustered at the civil parish level. Montiel-Pflueger first-stage F-statistics are reported for IV specifications. Mean dependent variables at baseline are reported. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table B.4: Lisbon and Porto: Individual Probability of Moving Out of the Municipality – Heterogeneity Analysis

Move Out of Municipality – Heterogeneity Analysis – OLS estimation								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Bottom Quartile	Top Quartile	Bottom Decile	Top Decile	No Prop. Income	Property Income	Below-median Property I.	Above-median Property I.
STR density	0.008*	0.004*	0.008**	0.002	0.008***	0.008***	0.013***	0.002
	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)
N	108486	113532	42850	45425	365972	82478	41097	41023
Adj-R^2	0.036	0.031	0.041	0.019	0.051	0.031	0.033	0.029
F-stat	125.588	73.295	102.274	19.361	288.450	102.650	140.244	70.592
Mean Dep. Var.	0.135	0.065	0.147	0.048	0.113	0.073	0.075	0.071
Base Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Move Out of Municipality – Heterogeneity Analysis – OLS estimation								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Homeowner	Tenant	Employed	Unemp.	Female	Male	Working Age	Retired Age
STR density	0.007***	0.008***	0.008**	0.009***	0.008***	0.009**	0.008***	0.009**
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)
N	249084	117666	253382	195068	296370	152080	267440	21361
Adj-R^2	0.056	0.050	0.052	0.048	0.044	0.008	0.043	0.053
F-stat	205.372	127.504	311.557	240.630	265.314	33.709	376.459	125.717
Mean Dep. Var.	0.093	0.103	0.101	0.111	0.131	0.054	0.129	0.173
Base Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Includes pre-treatment civil parish controls: pre-treatment per capita gross income growth (2015-2016), number of voters growth per civil parish (2013-2015), 2011 civil parish unemployment rate, 2011 civil parish percentage of adults with at least a college degree, 2011 civil parish population density; household controls: 2016 gross income, 2017 number of members, 2017 children presence, 2017 elderly presence; 2017 household head controls: gender, age, age-squared, marital status. Standard errors are clustered at the civil parish level. Mean dependent variables at baseline are reported. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table B.5: Lisbon and Porto: Individual Probability of Moving Out of the Municipality – Heterogeneity Analysis (*long-term residents*)

Move Out of Municipality – Heterogeneity Analysis								
	(1) Bottom Quartile	(2) Top Quartile	(3) Bottom Decile	(4) Top Decile	(5) No Prop. Income	(6) Property Income	(7) Below-median Property I.	(8) Above-median Property I.
STR density	0.013**	0.006*	0.014**	0.002	0.012***	0.009***	0.014***	0.002
	(0.005)	(0.002)	(0.004)	(0.003)	(0.002)	(0.003)	(0.004)	(0.003)
N	90148	94074	35553	37649	301598	70359	35035	35031
Adj-R^2	0.025	0.019	0.029	0.011	0.034	0.021	0.022	0.021
F-stat	115.103	66.426	74.966	13.840	239.687	117.594	40.906	67.034
First-Stage F-stat	19.133	33.431	21.582	37.211	20.797	26.371	26.384	26.749
Mean Dep. Var.	0.108	0.050	0.119	0.037	0.089	0.059	0.060	0.059
Base Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Move Out of Municipality – Heterogeneity Analysis								
	(1) Homeowner	(2) Tenant	(3) Employed	(4) Unemp.	(5) Female	(6) Male	(7) Working Age	(8) Retired Age
STR density	0.008***	0.014***	0.011***	0.012***	0.010***	0.015***	0.009***	0.012***
	(0.001)	(0.004)	(0.003)	(0.002)	(0.002)	(0.004)	(0.002)	(0.003)
N	209596	103406	212712	159245	228062	143895	205042	16063
Adj-R^2	0.035	0.041	0.034	0.035	0.032	0.008	0.032	0.043
F-stat	177.803	90.777	154.662	280.855	192.919	34.299	190.887	42.817
First-Stage F-stat	25.423	19.618	21.118	22.003	23.422	17.801	23.442	24.701
Mean Dep. Var.	0.071	0.087	0.079	0.088	0.103	0.051	0.101	0.140
Base Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Includes pre-treatment civil parish controls: pre-treatment per capita gross income growth (2015-2016), number of voters growth per civil parish (2013-2015), 2011 civil parish unemployment rate, 2011 civil parish percentage of adults with at least a college degree, 2011 civil parish population density; household controls: 2016 gross income, 2017 number of members, 2017 children presence, 2017 elderly presence; 2017 household head controls: gender, age, age-squared, marital status. Standard errors are clustered at the civil parish level. Kleibergen-Paap first-stage F-statistic reported for the IV estimation. Mean dependent variables at baseline are reported. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table B.6: Houshold Income and Work Outcomes – OLS estimation

	OLS estimation of Income and Work Outcomes										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Int. margin (2019-16)		**Int. margin (2019-17)**						**Ext. margin (2019-17)**		
	Δ Gross	**Δ Net**	**Δ Gross**	**Δ Net**	**Δ Labour**	**Δ Wage**	**Δ Self-empl**	**Δ Property**	**Δ Labour**	**Δ Wage**	**Δ Self-empl**
						Panel A: Total					
STR density	274.233	168.625	156.569	94.301	97.040	101.962	-5.801	16.402	0.001	0.002*	-0.002***
	(240.595)	(158.983)	(178.696)	(114.552)	(107.939)	(95.372)	(11.880)	(11.706)	(0.001)	(0.001)	(0.000)
N	330429	330429	330429	330429	330429	330429	330429	330429	330429	330429	330429
Adj-R^2	0.073	0.089	0.060	0.064	0.053	0.061	0.001	0.011	0.112	0.085	0.000
Mean Dep. Var.	26692.75	21276.88	27473.66	21797.11	26548.02	24668.88	1879.14	1363.90	0.931	0.892	0.139
						Panel B: Homeowners in 2016 & Stayers					
STR density	565.648	355.549	328.261	198.716	244.653	212.878	14.580	36.579*	0.001	0.003**	-0.001
	(328.285)	(212.003)	(252.249)	(161.507)	(151.434)	(141.461)	(14.641)	(16.765)	(0.001)	(0.001)	(0.001)
N	160308	160308	160308	160308	160308	160308	160308	160308	160308	160308	160308
Adj-R^2	0.070	0.089	0.053	0.059	0.052	0.059	0.002	0.009	0.107	0.087	0.000
Mean Dep. Var.	35205.21	27257.09	36143.37	27841.25	34681.16	32380.42	2300.74	1992.51	0.938	0.902	0.154
						Panel C: Homeowners in 2016 & Movers					
STR density	29.997	-46.155	-179.986	-181.324*	-200.089*	-193.317	19.690	43.898*	-0.003	0.001	-0.001
	(213.812)	(141.297)	(139.507)	(86.253)	(96.804)	(96.759)	(32.762)	(19.791)	(0.002)	(0.002)	(0.006)
N	17187	17187	17187	17187	17187	17187	17187	17187	17187	17187	17187
Adj-R^2	0.070	0.096	0.035	0.042	0.049	0.050	0.001	0.006	0.104	0.095	0.001
Mean Dep. Var.	23588.42	19200.33	24626.16	19926.61	23446.33	21624.48	1821.84	1025.80	0.931	0.863	0.170
						Panel D: Tenants in 2016 & Stayers					
STR density	-112.999	-95.450	-62.453	-51.047	-18.395	-1.928	-11.516	–	-0.000	0.000	-0.002**
	(115.379)	(83.885)	(79.147)	(56.611)	(62.617)	(54.147)	(6.038)	–	(0.001)	(0.001)	(0.001)
N	81016	81016	81016	81016	81016	81016	81016	–	81016	81016	81016
Adj-R^2	0.082	0.095	0.077	0.079	0.064	0.073	0.000	–	0.141	0.103	0.001
Mean Dep. Var.	16740.98	14458.15	17049.32	14710.36	16969.24	15925.57	1043.67	–	0.938	0.908	0.098
						Panel E: Tenants in 2016 & Movers					
STR density	-49.487	-45.956	7.602	29.379	-22.848	-8.587	-4.950	–	0.003	0.003	0.001
	(157.779)	(116.526)	(123.541)	(93.506)	(109.163)	(104.525)	(21.034)	–	(0.004)	(0.004)	(0.002)
N	9477	9477	9477	9477	9477	9477	9477	–	9477	9477	9477
Adj-R^2	0.067	0.081	0.048	0.051	0.046	0.052	-0.000	–	0.118	0.106	0.000
Mean Dep. Var.	15804.45	13744.14	16470.00	14275.64	16311.55	15092.73	1218.81	–	0.923	0.886	0.130
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Includes pre-treatment civil parish controls: pre-treatment per capita gross income growth (2015-2016), number of voters growth per civil parish (2013-2015), 2011 civil parish unemployment rate, 2011 civil parish percentage of adults with at least a college degree, 2011 civil parish population density; household controls: 2016 gross income, 2017 number of members, 2017 children presence, 2017 elderly presence; 2017 household head controls: gender, age, age-squared, marital status. Standard errors are clustered at the civil parish level. Outcomes are winsorized at the 1st and 99th percentiles within each estimation sample. Mean dependent variables at baseline are reported. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table B.7: First-Stage of Table 4

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Int. margin (2019-16)		**Int. margin (2019-17)**						**Ext. margin (2019-17)**		
	Δ Gross	**Δ Net**	**Δ Gross**	**Δ Net**	**Δ Labour**	**Δ Wage**	**Δ Self-empl**	**Δ Property**	**Δ Labour**	**Δ Wage**	**Δ Self-empl**
SSIV Amenities	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
N	448450	448450	448450	448450	448450	448450	448450	448450	448450	448450	448450
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Includes pre-treatment civil parish controls: pre-treatment per capita gross income growth (2015-2016), number of voters growth per civil parish (2013-2015), 2011 civil parish unemployment rate, 2011 civil parish percentage of adults with at least a college degree, 2011 civil parish population density; household controls: 2016 gross income, 2017 number of members, 2017 children presence, 2017 elderly presence; 2017 household head controls: gender, age, age-squared, marital status. Standard errors are clustered at the civil parish level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table B.8: Household Income and Work Outcomes (*long-term residents*)

	2SLS estimation of Income and Work Outcomes										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Int. margin (2019-16)		**Int. margin (2019-17)**						**Ext. margin (2019-17)**		
	Δ Gross	**Δ Net**	**Δ Gross**	**Δ Net**	**Δ Labour**	**Δ Wage**	**Δ Self-empl**	**Δ Property**	**Δ Labour**	**Δ Wage**	**Δ Self-empl**
						Panel A: Total					
STR density	614.177*	392.295	418.923	246.564	255.812*	240.009*	3.769	37.101*	0.002*	0.003***	-0.002**
	(307.996)	(200.537)	(232.363)	(147.128)	(128.180)	(105.222)	(16.849)	(16.097)	(0.001)	(0.001)	(0.001)
N	273613	273613	273613	273613	273613	273613	273613	273613	273613	273613	273613
Adj-R^2	0.070	0.086	0.061	0.065	0.054	0.063	0.001	0.012	0.121	0.094	0.000
Montiel-Pflueger	21.363	21.363	21.363	21.363	21.363	21.363	21.363	21.363	21.363	21.363	21.363
Mean Dep. Var.	26692.75	21276.88	27473.66	21797.11	26548.02	24668.88	1879.14	1363.90	0.931	0.892	0.139
						Panel B: Homeowners in 2016 & Stayers					
STR density	1105.876*	687.080*	707.881*	435.820*	450.580*	402.789*	20.217	77.560**	0.001	0.003**	-0.002
	(439.071)	(279.129)	(330.080)	(207.108)	(187.862)	(157.920)	(23.118)	(26.012)	(0.001)	(0.001)	(0.001)
N	137876	137876	137876	137876	137876	137876	137876	137876	137876	137876	137876
Adj-R^2	0.067	0.086	0.053	0.059	0.052	0.060	0.001	0.010	0.113	0.094	0.000
Montiel-Pflueger	25.320	25.320	25.320	25.320	25.320	25.320	25.320	25.320	25.320	25.320	25.320
Mean Dep. Var.	35205.21	27257.09	36143.37	27841.25	34681.16	32380.42	2300.74	1992.51	0.938	0.902	0.154
						Panel C: Homeowners in 2016 & Movers					
STR density	548.452	377.236	33.056	-52.294	-432.085*	-219.492	-115.729	34.441	-0.008**	-0.005	-0.011
	(538.595)	(367.466)	(385.361)	(251.247)	(168.521)	(176.291)	(77.982)	(24.583)	(0.003)	(0.003)	(0.006)
N	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935	10935
Adj-R^2	0.073	0.101	0.037	0.046	0.054	0.056	-0.000	0.006	0.114	0.100	-0.000
Montiel-Pflueger	24.398	24.398	24.398	24.398	24.398	24.398	24.398	24.398	24.398	24.398	24.398
Mean Dep. Var.	23588.42	19200.33	24626.16	19926.61	23446.33	21624.48	1821.84	1025.80	0.931	0.863	0.170
						Panel D: Tenants in 2016 & Stayers					
STR density	76.197	41.923	85.377	54.486	96.497	89.201	-2.750	–	0.001	0.002	-0.002
	(137.615)	(101.076)	(108.401)	(79.704)	(99.438)	(76.737)	(13.902)	–	(0.001)	(0.001)	(0.001)
N	72601	72601	72601	72601	72601	72601	72601	–	72601	72601	72601
Adj-R^2	0.081	0.094	0.079	0.082	0.069	0.078	0.000	–	0.148	0.113	0.001
Montiel-Pflueger	19.649	19.649	19.649	19.649	19.649	19.649	19.649	–	19.649	19.649	19.649
Mean Dep. Var.	16740.98	14458.15	17049.32	14710.36	16969.24	15925.57	1043.67	–	0.938	0.908	0.098
						Panel E: Tenants in 2016 & Movers					
STR density	79.034	45.404	20.755	19.615	-56.802	-83.141	-17.756	–	0.001	0.003	-0.003
	(139.210)	(110.024)	(113.647)	(91.145)	(140.271)	(124.164)	(41.843)	–	(0.004)	(0.003)	(0.005)
N	7064	7064	7064	7064	7064	7064	7064	–	7064	7064	7064
Adj-R^2	0.069	0.085	0.045	0.052	0.050	0.056	0.000	–	0.123	0.110	0.001
Montiel-Pflueger	22.097	22.097	22.097	22.097	22.097	22.097	22.097	–	22.097	22.097	22.097
Mean Dep. Var.	15804.45	13744.14	16470.00	14275.64	16311.55	15092.73	1218.81	–	0.923	0.886	0.130
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Includes pre-treatment civil parish controls: pre-treatment per capita gross income growth (2015-2016), number of voters growth per civil parish (2013-2015), 2011 civil parish unemployment rate, 2011 civil parish percentage of adults with at least a college degree, 2011 civil parish population density; household controls: 2016 gross income, 2017 number of members, 2017 children presence, 2017 elderly presence; 2017 household head controls: gender, age, age-squared, marital status. Standard errors are clustered at the civil parish level. Outcomes are winsorized at the 1st and 99th percentiles within each estimation sample. Montiel-Pflueger first-stage F-statistics are reported for IV specifications. Mean dependent variables at baseline are reported. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.