Local Discretion in Low-Income Housing Policy: Evidence from France*

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November 7, 2025

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Abstract

Governments seek to promote affordable housing development in mixed-income neighborhoods while preserving local municipal discretion over land use. Municipalities who retain local discretion better cater to local preferences, but only internalize preferences of incumbent residents and underprovide affordable housing. I quantify the trade-off in allowing municipal discretion over affordable housing provision when residents care about their peers. I leverage a discontinuity in a French policy which allows municipalities to build more social housing or pay a fine. Limiting local discretion increases social housing provision by over 30% and induces a compositional shift in the private housing stock: high-income households move out and low-incomes move in. I estimate a structural location choice model to quantify the welfare impacts of local discretion. Using the policy to identify heterogeneous preferences for low-income neighbors, I find that all households dislike low-income peers, especially high-income households who are willing-to-pay €538 per month to avoid a 20 p.p. increase in the share of low-income residents. Removing local discretion entirely in favor of a full mandate cuts the number of highly socioeconomically segregated municipalities in half.

JEL codes: D6, H7, L5, R1, R2

Keywords: Housing policy, Local discretion, Spatial sorting, Neighborhood inequality

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1 Introduction

The United States and most developed countries believe they face a housing crisis.[1] This broad recognition that more and cheaper housing is necessary is met with intervention; however it is unclear which level of government is best suited to solve this issue. Housing is historically controlled at the local level, since municipalities are best suited to meet the needs and preferences of their constituents, but local governments consistently inhibit new developments. Against *Not-In-My-Backyard* (NIMBY) sentiment, central governments are increasingly exerting greater control over local housing to address this externality inherent in municipal decision-making.

So-called "fair share" housing policies allow central governments to erode local control over housing policy by adjusting incentives while preserving some local discretion. New York State recently proposed providing cities with substantial tax benefits if they reach centrally-determined housing goals. [2] Other fair share housing policies have already been implemented in New Jersey, Connecticut, and California. These policies affect neighborhood composition beyond the provision of new affordable units, as wealthy residents may move out to avoid living near low-income households. A key challenge in the implementation of these policies is to balance the peer preferences of incumbent residents with the inefficiencies from socioeconomic segregation (Chetty and Hendren, 2018; Davis et al., 2021).

This paper quantifies how local discretion in housing policy affects socioeconomic segregation and incumbent resident welfare across space. Using an event study design, I causally establish that, after an influx of low-income residents, out-migrants are on average richer and other in-migrants are on average poorer, confirming the importance of re-sorting. I then build and estimate a structural model to quantify the consequences of the selection inherent in local discretion given how important the subsequent re-sorting is to the equilibrium outcome.

The central empirical challenge lies in identifying the causal effect of low-income residents on sorting behavior. Specifically, do high-income households avoid municipal-

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[1] The affordability crisis has been recognized in the US, the UK, across Europe, and globally.

[2] While not ultimately passed, New York State sought to incentivize municipalities by offering large financial benefits to municipalities able to reach predetermined housing goals.

ities with a larger share of low-income residents because of direct preferences regarding neighborhood composition, or because such municipalities differ along unobserved dimensions correlated with resident composition?

To isolate exogenous variation in the share of low-income residents that is orthogonal to unobserved neighborhood quality, I use the *Loi relative à la solidarité et au renouvellement urbains* (SRU). This law was enacted in 2000 by the French state to improve access to affordable housing and reduce social segregation by distributing new affordable units more evenly across space. The law originally required that, by 2020, at least 20% of the housing stock in certain municipalities must consist of affordable social housing. Municipalities that fail to make adequate progress face fines proportional to their operating budgets. Municipalities who were above a population threshold were subject to the policy while those just below the threshold were not.

Using administrative data on the universe of residential buildings and their occupants, I exploit the SRU to compare the municipalities close to the population threshold. I find that the policy increases the stock of social housing in treated municipalities by approximately 30 units, a 31% increase in the social housing stock on average. Exposure to the policy also increases the proportion of low-income residents in treated municipalities in private housing. Despite the policy goal to reach 20% social housing, some municipalities exert local discretion and choose not to comply with the law. Roughly 10% of subjected municipalities chose to remain delinquent and paid fines to the state in 2017. I find that residents also re-sort across municipalities in response to the law. Municipalities who are subject to the policy observe a net outflow of richer residents compared to control municipalities, a disparity of around €400 in median income, even after accounting for the mechanical increases in social housing in the treated municipalities.

The causal reduced-form effect of the SRU on household migration emphasizes that the equilibrium effects of local discretion are not limited to local housing provision. Changes in municipalities' local discretion also impact the distribution of households and prices, beyond the direct increases in social housing. The subsequent migrations brought by these prices changes makes it difficult to assess the effect of local discretion on overall welfare without a structural model.

To explore these spatial spillovers from local discretion in housing provision, I estimate a discrete location choice model with moving costs and heterogeneous household

peer preferences. Households choose where to live depending on municipality attributes and the fraction of low-income households in the area. Households differ in their location preferences by income type, and the model allows for unobserved preference heterogeneity with respect to price and the fraction of low-income households.

Since the fraction of low-income households in a municipality is confounded with its unobserved quality, I use the local difference around the SRU population threshold to identify the impact of an exogenous shift in the fraction of low-income residents. Using Simulated Method of Moments (SMM), I match the discontinuity of inflow over time between treated and control municipalities across income groups. Prices are also correlated with unobserved neighborhood quality, so I use Gandhi and Houde (2019) optimal instruments derived from attributes of the housing stock in neighboring municipalities in line with (Bayer et al., 2007; Park, 2024; Almagro et al., 2023).

Model estimates imply that all households dislike living near low-income residents, especially high-income households who are willing to pay 19% higher rents—more than €500 per month—to avoid a 20-percentage point increase in the fraction of low-income residents in their municipality. Low-income households are only willing to pay 13% higher rents—€350 per month. These results are smaller but quantitatively similar to other models estimating the willingness-to-pay to live near racial peer groups (Galiani et al., 2015; Almagro et al., 2023).

I simulate two policy counterfactuals by varying the extent of local discretion. Using my structural estimates, I solve for new equilibrium prices and location choices to capture the overall effect of these policies. First I consider a world of full discretion, where the SRU policy had not been implemented and social housing was left in the hands of local municipalities. I find that, absent the SRU, socioeconomic segregation would have been higher. Compared to the current environment, the share of low-income households in the median municipality decreases from 24% to 21%.

Second, I simulate the impact of a full mandate by reallocating the existing social housing proportionally to each municipalities' building obligation. With no local discretion left to municipalities, socioeconomic segregation in the median municipality decreases further and the share of low-income households increases from 21% to 26%. Moving from full local discretion to no local discretion cuts the fraction of municipalities with fewer than 20% low-income households from 41% to 15%.

Finally I quantify the contribution of household migration in response to implementing the previous mandate. Before re-sorting the full mandate would have moved the median treated municipality to 29% low-income from 26% low-income, indicating that the spillovers from relocation are an especially important force in socioeconomic segregation, since the gains are nearly as large as moving from a partial discretion environment to a full mandate. Thus understanding re-sorting patterns is crucial to understanding the impact of the SRU and place-based policies more generally.

The transition from full local discretion to no local discretion yields an aggregate compensating variation of roughly –€-116 million across all income groups in private housing in Bordeaux, indicating a substantial welfare loss in the no local discretion equilibrium. However the fraction of very segregated municipalities drops from 41% to 15% and the private housing welfare loss is not taking into account the welfare gains that the social housing residents experience which may be substantial since they accrue both directly, through rent subsidies, and indirectly, better education and job opportunities. To offset the welfare loss on the private market, the gains to social housing recipients need to be at least €3,134 per household. This of course includes some new social housing recipients through the expansion of social housing and some reallocated social housing. Comparing the partial discretion scenario to the the no discretion scenario requires only offsetting about €400 per social housing recipient and includes no expansion of social housing, merely reallocation.

Related Literature   First it is connected to the literature on voluntary regulation which take seriously the impact of selection on the efficiency of policies since municipalities choose whether to build or not ((Einav et al., 2021; Heckman and Honoré, 1990; Ito et al., 2023; Gonçalves and Mello, 2023)). The effectiveness of voluntary regulation depends on who selects in, whether there is "selection on levels", where the municipalities that build the social housing would have built it absent the policy or "selection on gains" where the municipalities use their private information on costs and benefits to select into building when it is cheapest and least disruptive to their incumbent residents. Most directly related, Soltas (2024) looks at developers opting to build low-income units in exchange for tax breaks. I contribute by highlighting how the decisions of a third actor, the residents who themselves, can select in and out of being "treated" with an increase of low-income

residents associating compliance with the law. The selection induced by the migration decisions of these residents is unavoidable but influenced by the choices of the municipality.

This research will contribute to our understanding of affordable housing policy design. There is a large literature on the benefits of low-income residents growing up in wealthier areas, (Chetty et al., 2016; Chetty and Hendren, 2018; van Dijk, 2019; Davis et al., 2021) which are far reaching and particularly salient for children. Several papers study how to accomplish this, Cook et al. (2024) looks at how the location of low-income Housing Tax Credits impacts household welfare and racial segregation. Davis et al. (2021) directly imagines restricting voucher usage to wealthier neighborhoods and Park (2024) looks at welfare implications of increasing generosity of voucher systems. Soltas (2022) looks at the cost of a tax benefit in exchange for integrating low-income housing in market rate housing in New York City. Blanco and Sportiche (2024) studies reactions to the construction of low-income housing in Massachusetts. This will also contribute to the literature using equilibrium models of sorting to recover interconnected preferences in demand for schools, (Allende, 2021) and for neighborhoods (Bayer et al., 2007; ?; Diamond and McQuade, 2019; Bayer et al., 2022; Almagro et al., 2023; Davis et al., 2023) to which I bring a new identification strategy.

Most directly, this research will also contribute to the evaluation of the SRU's enduring legacy and effectiveness. While some quantitative and qualitative research has been done on the efficacy of the SRU (Freemark, 2021; Blanc, 2010; Levasseur, 2016; Maaoui, 2021). Most closely related, Chapelle et al. (2022), also use a differences in differences approach around the eligibility cutoff and find that among marginal municipalities the SRU did stimulate an increase in social housing construction. I extend the existing research by showing that the law not only increased the stock of social housing but that some was new construction rather than conversion, that it led to an increase in the proportion low-income in treated municipalities and that it led to changed in migration behavior into and out of treated municipalities.

The preference estimation I propose will additionally contribute by being able to provide some insight on the welfare consequences of allowing municipalities to opt out of constructing new social housing by paying a fine. It will also be able to forecast how municipalities might behave if the fees for noncompliance were increased, or a full man-

date was implemented. In this way it will go beyond analyzing the results from the SRU but also be able to predict what might happen under changes to the policy which further differentiates this study from previous research.

This paper is organized as follows; Section 2 discusses the SRU law and public housing in France in more detail, Section 3 introduced the data sources used in this project, and Section 4 discusses some stylized facts. In Section 5, I develop the model of housing demand, I present the results in Section 8 and the counterfactuals in Section 9. Finally Section 10 concludes.

2 SRU and Social Housing in France

2.1 Social Housing in France

While housing programs in France take many forms, the SRU focuses exclusively on social rental housing. There are four types of subsidies that fall into that category, PLAI, PLUS, PLS, and PLI which differ in their generosity and income thresholds. PLAI is for the poorest tenants and has the most generous subsidies. PLUS is the most common and PLS and PLI are for middle-income tenants (Freemark, 2021; Chapelle et al., 2022). Households are means-tested at entry but once granted can be kept indefinitely. The level of subsidies that households receive is defined by predetermined income thresholdsfunded by the central government.[3] Social housing renters pay a fixed rent, capped at a government mandated amount per square foot.[4]

Social housing is largely built and managed by large non-profits entities called HLMs. To increase social housing, new social housing unit could be built or existing units could be converted to social housing. The municipality's discretion is exercised by granting or denying building permits to new social housing projects (Maaoui, 2021).

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[3]These thresholds differ depending on whether the rental unit is in the Paris region as well as family structure and type of rental housing.

[4]The rent is determined by the type of unit and the size.

2.2 The SRU Law

The *Loi relative à la solidarité et au renouvellement urbains* (SRU), proposed by the French government in January 2000 and voted into law in December by the French parliament, aims to increase social housing stock and decrease concentrated poverty by incentivizing social housing construction in municipalities with very little existing stock (Maaoui, 2021; Chapelle et al., 2022; Freemark, 2021; Levasseur, 2016). Importantly Article 55 of the SRU stipulates that any municipality above the designated population level in 1999—$1,500$ people in Île-de-France and $3,000$ people elsewhere— must build social housing until it reaches up 20% of their total stock by 2020.

When the SRU was enacted, each municipality subject to Article 55 was required to close 5% of the gap between the current fraction of social housing and the 20% goal per year, which would imply reaching their goal by 2020. The municipalities that are under this 20% threshold are subject to an annual levy which is proportional to the size of the gap and the "tax potential" of their residents, and is capped at a proportion of their annual budget. Municipalities can deduct any expenditures on social housing from this levy, for instance land subsidies or development costs of social housing within the municipal limits (Levasseur, 2016).

The levy is collected annually and recalculated every three years. In addition to this levy, the regional prefect sets a number of social housing units as a goal every three years. Municipalities who fail to meet this amount risk being declared "delinquent" and face substantially larger fines. The regional prefect has some discretion over declaring whether the municipality is delinquent and how much to increase the levy, depending on whether the municipality has made good faith progress towards meeting their objective, taking into consideration unique challenges (Levasseur, 2016).

The fine structure is succinctly expressed by Chapelle et al. (2022) as,

$$Fine_t = \min[0.2F_t(20 - P), 0.05E_{t-1}]$$

Where F_t is the fiscal potential of the municipality, a measure of the potential tax revenue a municipality can collect, P is the proportion of primary residences that are

social housing and E_{t-1} is municipality's expenditures the previous year [5] The fine is not collected if it less than $3,871$ euros. Note this fine means municipalities with the largest population of high-income individuals, and those furthest from the 20% target face the largest fines. It also implies that there is a region where building social housing does not decrease the fine burden. While this analysis does not yet exploit this region or discontinuity explicitly, it remains an interesting to tool to exploit in future research.

Subsequent revision to the SRU selectively increased the target threshold to 25% as part of Duflot I, visually depicted in figure 1, passed in 2013. Since the fines proved insufficient to induce certain municipalities to attempt to comply with the law, Levasseur, 2016 this was followed by the introduction of Duflot II/ALUR which increases fivefold the maximum levy as well as raise the cap on the maximum fine to 7.5% of the municipalities' operating budgets. It additionally required that at least 30% of social housing was reserved for the poorest social housing residents in PLUS/PLAI (Levasseur, 2016).

While my results are consistent with existing research that the SRU did increase the number and fraction of social housing units (Maaoui, 2021; Chapelle et al., 2022; Freemark, 2021), the SRU is far from achieving its targets. As of 2017, $1,222$ had not reached their final goal, of which 269 were deemed "outlaws" and potentially subjected to increased fines which generated 77 million (Maaoui, 2021). Despite the heterogeneous compliance, between 1999 and 2017 the total social housing stock increased from 4.1 million to 4.9 million (Maaoui, 2021).

3 Data

The following section describes the construction of and advantages and limitations of the data used for this project.

Residential Stocks   The primary data source is the *Fichier des Logements par Communes* (FILOCOM), compiled by the Ministry of the Environment (SDES) using tax records from the Ministry of Finance (DGFIP). Covering every other year from 1995 to 2017, FILOCOM provides comprehensive data on all residential buildings and taxpayers, geolocated to the

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[5]Prior to 2006, the state charged a flat fine per missing social housing unit.

municipality level. It includes detailed information about housing units, such as social housing status, assessed tax value, construction year, number of rooms, bathrooms, and more. Crucially, it also includes information on occupants, including income, household structure, and occupancy tenure, which allows tracking of household moves into and out of each municipality. A key limitation of this dataset, however, is that it cannot follow households over time after they relocate, as the panel structure tracks housing units rather than individual households. Still, from this data source I am able to identify which households are moving into each municipality and which is moving out.

Bilateral Moves   To address the limitations of FILOCOM, I supplement it with the *Fichier Démographique sur les Logements et les Individus* (FIDELI), which includes similar information on housing and individuals but is available annually from 2015 to 2017 and enables tracking of households that relocate over time. This dataset provides cross-sectional data on bilateral moves, which is essential for identifying moving costs in the model.

Additional Sources   To supplement, I collect data from two publicly available sources. The *Système d'Information et de Traitement Automatisé des Données Elémentaires sur les Logements et les locaux* (SITADEL) contains annual data on permits and new construction throughout the sample period, allowing me to document that a portion of social housing units result from new construction. Records on fines levied against non-compliant municipalities come from municipal balance sheets.[6]

In France, collecting data on race remains illegal, so this analysis focuses solely on socioeconomic segregation, as only socioeconomic data is available. This limitation makes it impossible to disentangle distaste for low-income neighbors from distaste for neighbors of specific ethnic backgrounds. Existing data shows a significant overlap between social housing residents and immigrants, many of whom come from outside Europe (Schmutz and Verdugo, 2023; Levasseur, 2016). Consequently, this study can estimate distaste for low-income residents in general but cannot identify the precise underlying factors. These may include changes in school quality, local amenities, crime rates, or prejudices based on race or class. For social housing policy, however, the primary concern

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[6]The balance sheets are publicly available directly through the Direction générale des Finances publiques (DGFiP) at this link. A cleaned version by Alexandre Lechenet is available on data.gouv.fr at this link.

is the overall outcome of these preferences, rather than the exact source.

The reduced form analysis is done at the level of metropolitan France, excluding overseas departments. The model however is estimated on the city of Bordeaux. Bordeaux is the sixth largest urban area in France behind Paris, Marseilles, Lille, Lyon, and Toulouse. Since the 2000s, France has undergone a municipality consolidation incentive program [7] which makes it more difficult to track units over time, Bordeaux experienced few consolidations during this time period. Aside from the tractability of focusing on a smaller city, Bordeaux is a fairly separate market with no other major cities nearby so there are fewer municipalities that belong to more than one urban center, Bordeaux is a well designed urban center. For disclosure purposes, several of the smallest outer regions are omitted, which leaves a sample of 105 municipalities, 37 of which are above the SRU threshold

4   Reduced Form Results

This section describes the impact of the SRU. Section 4.1 describes the econometric strategy, section 4.3 explores how municipalities responded to the introduction of the SRU and section 4.2 provides some support for the sorting mechanism undermining policy goals.

4.1   Identification Strategy

The identification strategy exploits the population threshold in 1999 which is used to establish whether a municipality is subject to Article 55. If the municipality has more than 1,500 legal residents and it is in the Paris region or has more than 3,500 legal residents and is outside the Paris region, it is subject to Article 55 and obligated to build or else pay the fine.

The identification relies on the assumption that municipalities with populations just under the threshold and those just above the threshold would have behaved the same absent the policy and thus the jump I observe comes from the policy. Figure 2a is a binned scatterplot of the number of social housing units in 1999 against the distance to the pop-

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[7]Consolidated municipalities are still obligated to meet their SRU obligations within their old borders so it is not a mechanism by which municipalities can better segregate social housing from other residents.

ulation threshold which has been rescaled according to the region the municipality is in since municipalities in the Paris region face a different threshold. There is a clear upward trend, larger municipalities have more social housing units, but no discontinuity around the population threshold. Figure 2b plots a binned scatterplot of the median assessed monthly rent against the distance to the population threshold. Municipalities with larger populations have larger assessed median monthly rents but there does not appear to be a jump around the policy. Figure 2c does the same but for median household income and Figure 2d for the fraction of households that are renters. Both are lower for very small municipalities, which are more likely to be rural, but there in not a clear trend in population size.

With identification strategies that rely on a discontinuity it is often a concern that actors are able to manipulate which side of the threshold they fall on. However this is unlikely to be the case in my setting. The law was first introduced in 2000 but retroactively used legal populations in 1999 in determining who would be subject to the law. Nonetheless Figure 3a is a histogram of the 1999 population of municipalities outside the Paris region with the population threshold marked by the dotted line. Figure 3b is a histogram of the 1999 population of municipalities inside the Paris region and the dashed line marks their population threshold. If municipalities were avoiding being subject to the policy or manipulating their legal population, we would expect to see bunching to the left of the threshold which we do not.

I select a bandwidth of within 700 of the population threshold which results in sample size of 855 municipalities, 319 of which are treated. From this sample I also omit rural municipalities which were not subject to the law and municipalities that are over the 20% social housing goal, since they were not treated by the policy. The intuition behind the identification strategy is illustrated by Figure 4. This is a binned scatterplot of the number of new social housing units built since 1999, the control municipalities are the ones to the left hand side of the dashed line which represents the population threshold. The municipalities to the right of the dashed line were treated by the law. The jump in construction from about 30 social units to about 55 social housing units is interpreted to be a result of the law.

Table 1 depicts the average attributes of the sample across treatment status as well as the p-value from a t-test difference of means. Panel A compares 1999 attributes of con-

trol and treated municipalities in the Paris region. While not statistically significant at the 5% level, the control municipality do have a larger share of owner occupied housing, slightly smaller share of social housing, and lower monthly assessed rent. The population is significantly smaller. On average control municipalities have a population of $1,081$ while treated municipalities are larger with a population of $1,809$. Panel B does the same for the rest of France, which had the higher population threshold. The difference between the average median assessed rent, share owner occupied and population size are all statistically significant. Control municipalities have more owner occupied housing, smaller median rents, and smaller population sizes. In both cases, due to prevalence of small municipalities, the control sample is larger than the treated sample.

To explore the effect of SRU's Article 55 over time, I adopt a two way fixed effects (TWFE) estimation strategy,

$$Y_{it} = \alpha_i + \lambda_t + \sum_{l=-1}^{17} \tau_t \mathbb{1}(t = l) \times treated_i + \epsilon_{it} \tag{1}$$

where i denotes the municipality, t denotes the year. Y_{it} is the dependent variable either number of social housing units, fraction of total housing that are social housing units, or cumulative number of social housing units permitted depending on the specification. The coefficients of interest are τ_1 through τ_{17} which represent the difference in $Y_i t$ between the treated and control municipalities over time. Note the regression also include municipality level fixed effects as well as time fixed effects.

While recent research in econometrics has pointed out flaws in TWFE designs (de Chaisemartin and D'Haultfoeuille, 2019; Goodman-Bacon, 2021), all units in the sample are treated in 1999, avoiding the potential of negative weights. An important caveat is necessary however is the set up does raise concerns regarding SUTVA—this is of specific concern regarding the migration regressions. SUTVA would be violated if the decision to build in one municipality is impacted by the decision to build in a neighboring municipality. There is also the concern that displacement could be impacting the migration regressions. Because treated and control municipalities are in close proximity, it is entirely possible that there is some interference. It is not certain that each household that moves out of a treated municipality moves into a control municipality since the estima-

tion is just a small fraction of the more than 36,000 municipalities in France, but remains an important caveat.

4.2   Direct Impacts

Municipalities subject to Article 55 create more social housing   Figure 5 plots the coefficients τ_1 through τ_{17} and the 95% confidence intervals from equation 1 where the dependent variable is the total number of social housing units in each municipality. Consistent with the long lag times one typically sees in housing construction, the social housing stock of treated municipalities is slow to respond to the law. It is not until 2005 that the number of social housing units differs significantly from the control group. The difference between the control and treated municipality steadily grows over time, accelerating around the time the fines were increased. The average treated municipality has 1245 primary residences which means the roughly 30 unit increase represents 2.4% of the total stock. Of that, the average treated municipality has 95 social housing units in 1999 which means this works out to be a 31% increase in the social housing stock.

These results are more modest than in previous policy analyses, most credibly Chapelle et al. (2022) use a similar identification strategy accounting for previous legislation[8] and using a much larger bandwidth, they find a result nearly double.

If these results were extrapolated such that all treated municipalities built 2.4 % of their total stock in social housing, this would imply that roughly 380,000 social housing units were built as a result of Article 55 of the SRU, which is a little under half of the gains in social housing during this period. Of course there is an important distinction between the number of units built because of the SRU and the number of units built because of Article 55. The true number built because of the SRU is likely to be higher as even control municipalities respect the spirit of the law despite the lack of punitive measures. The difference between treated and control identified here, is the impact of being subject to potential fines.

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[8]The LOV law in 1991 also aimed to increase social housing in urban municipalities, while some of the municipalities cited in that law were referenced again in the SRU, there were no punitive measures and existed only to provide a framework for thinking about social diversity. Even which municipalities were cited in the law is not clear (Chapelle et al. (2022)). It was ultimately acknowledged as a failure and replaced by the SRU.

Some of the new social housing is new construction   The law did not specify whether the the housing stock had to be newly constructed or acquired - one potential concern is that municipalities took existing low quality, low-income housing and converted it to social housing. To check whether this is the case, I look at the cumulative number of permits filed in treated versus untreated municipalities within the bandwidth using the specification described in equation 1. I graph the coefficients τ_1 through τ_{17} and the 95% confidence intervals. Treated municipalities are permitting more new social housing than control municipalities and municipalities respond faster to the law compared to the realized changes to the housing stock, represented by the grey line, as expected.

The proportion of low-income residents increases   Finally figure 7 plots τ_1 through τ_{17} with the 95% confidence intervals comparing the difference between fraction of the municipality that is low-income between treated and control municipalities. By 2011, the increase is significant. This result implies that the increase in social housing is reflected in the population. This result is consistent with more low-income residents moving into the new social housing but it could also partially be driven by wealthier residents moving out of treated municipalities. For identification of my model, it is important that the discontinuity around the policy is associated with a shift in underlying demographics of the municipality. It is precisely this influx of low-income residents and the corresponding response by the high-income residents that will help identify preferences that nonsocial housing low-income, middle-income and high-income residents have regarding low-income residents.

4.3   Compliance with the policy

Before the policy was introduced, higher income municipalities were less likely to have substantial amounts of social housing, indicated by sharply down sloping line of best fit in figure 8a. Since the higher income municipalities have less social housing to begin with and the fine is tied both to the municipality's tax base and the distance they are to the threshold, these higher income municipalities are facing the highest yearly fines.

Figure 8b provides suggestive evidence that municipalities with higher income res-

idents are less likely to comply with the policy, despite facing the largest fines. For municipalities subject to the SRU, it plots the change in the fraction of primary residences that are social housing against the log median income of that municipality. Two facts are evident from this scatterplot. First that there is a substantial amount of noncompliance, all municipalities below 0 are should have been increasing their social housing stock and are not, a significant fraction have actually decreased their total fraction of social housing stock. Second, the change in the fraction of social housing is negatively correlated with log median income–the municipalities with richer residents are less likely to increase the fraction of their total housing that is social housing.

Figure 9a and 9b make this point spatially in the city agglomeration where the model will be estimated, Bordeaux. The agglomeration is defined as any municipality where at least 15% of residents commute to the central business district for work. Figure 9a shows the fraction of each municipality's housing stock that is social housing. The center of the city has the largest fraction of social housing though certain municipalities farther out also have a substantial amount. Figure 9b shows the logged median income of each municipality. The highest income municipalities form a partial ring around the city center. The more rural municipalities have low social housing stock as well as low-income.

Whether this relationship is driven by preferences, high-income residents blocking social housing proposals in their municipality, or costs, high-income residents live in areas where it is more costly to build, cannot be determined from scatterplots and maps alone. It is clear however that there is some selection in compliance with the SRU that seems to undermine the goal of decreasing social segregation, at least when it comes to mixing low and high-income residents.

Differing migration patterns between treated and control municipalities   Residents also appear to respond to the increase in social housing when choosing if to move and where to move. To look at changes in migration regression specification in equation 1 is estimated on the set of all municipalities in France within the bandwidth around the population threshold. Data on migration is available from 2001 onwards so the in-mover rate in 2001 includes any household that moved between 1999 and 2001 and is restricted to those not moving into or out of social housing. Figure 10 shows the difference between

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median income of in-movers and the median income of out-movers between treated and control municipalities over time. From this plot, it seems that the difference between in-movers and out-movers is larger in treated municipalities–the difference is around 400 euros by the end of the period.

It is not obvious whether the median income of out-movers is higher in treated municipalities or the median income of in-mover is lower since both could generate this pattern. Figure 11 is able to provide some insight. It displays the coefficients from two regressions, one in the difference in median annual income of out-movers between treated and control municipalities and the difference in median annual income of in-movers between treated and control municipalities again using the specification in equation 1 and restricting to moves unassociated with social housing. While in difference between control and treated municipalities is not significant in either regression, the median annual income is higher for out-movers in treated municipalities and the median annual income is lower for in-movers in treated municipalities, indicating the difference in 10 is driven both by out-movers being having higher income and in-movers having lower income in treated municipalities

The model will use the result that the fraction of low-income increases in treated municipalities and that this results in differing migration behavior as useful variation to help identify how residents care about their peers, more specifically the fraction of the municipality that is low-income.

5   A Model of Neighborhood Demand

This section develops a model of residential sorting on the private housing market where households choose whether and where to move based on municipality attributes and their individual preferences. Households' preferences will differ in both observed and unobserved ways.

5.1   Demand

Define $\mathcal{J}$ as the set of municipalities within the considered metropolitan area, indexed by $j = 1, \cdots, J$. Let $m_{it-1} \in \mathcal{J}$ denote the municipality which household i currently

resides in. Household preferences differ in observably by income group $k \in \mathcal{K}$. At time t, household i chooses the new municipality m_{it} which maximizes their indirect utility function

$$m_{it} := \arg\max_{j} U^k_{ijt}(m_{it-1}) = \delta^k_{jt} + u_{ijt}(m_{it-1}) + \epsilon_{ijt}, \tag{2}$$

where δ^k_{jt} represents the indirect utility component common across all households of type k. Idiosyncratic household location preferences are gathered in $u_{ijt}(m_{it-1})$ and ϵ_{ijt}, an idiosyncratic error term assumed to be i.i.d. type I Extreme Value. The indirect utility component common to income group k is

$$\delta^k_{jt} = \bar{\beta}^k_\ell \ell_{jt} + \bar{\beta}^k_p p_{jt} + \beta^k_x x_{jt} + \xi^k_j + v^k_{jt}, \tag{3}$$

where ℓ_{jt} is the proportion of residents of municipality j in the bottom tercile of the income distribution of France, p_{jt} is the median assessed housing unit value in municipality j, and x_{jt} is a vector of observable neighborhood characteristics such as the proportion of multi-family units, the proportion of buildings constructed before 1920, and the proportion that are new construction. Finally ξ^k_j is a preference component for living in municipality j common to all households in income group k but unobserved to the econometrician and to be estimated. The individual-specific preferences component is

$$u_{ijt}(m_{it-1}) = (\beta^k_{i,\ell} - \bar{\beta}^k_\ell)\ell_{jt} + (\beta^k_{i,p} - \bar{\beta}^k_p)p_{jt} + \gamma^k_0.\mathbb{1}\{j \neq m_{it-1}\} + \gamma^k_1.\|j, m_{it-1}\|. \tag{4}$$

Households differ in their preferences for living in the same municipality as low-income residents (ℓ_{jt}) and in their sensitivity to prices (p_{jt}). This unobserved heterogeneity is parametrized by $\beta^k_i \sim \mathcal{N}(\bar{\beta}^k, \Sigma^k)$, where $\beta^k_i := [\beta^k_{i,\ell} \ \beta^k_{i,p}]'$ and $\bar{\beta}^k := [\bar{\beta}^k_\ell \ \bar{\beta}^k_p]'$ are column vectors, and Σ^k is a diagonal variance matrix.[9] Households must also pay moving costs γ^k_0 when considering a municipality j other than the municipality they currently live in (m_{it-1}), proportional to distance by a factor γ^k_1.

The model parameters for income group k are $\theta^k := \{\beta^k_x, \bar{\beta}^k, \Sigma^k, \gamma^k_0, \gamma^k_1, \xi^k\}$ to be es-

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[9] Thus, $\beta^k_{i,\ell} - \bar{\beta}^k_\ell$ is the deviation of household i's preference for living next to low-income residents from the average coefficient within group k and $\beta^k_{i,p} - \bar{\beta}^k_p$ is similarly the deviation of household i's price sensitivity to the average price coefficient within group k.

timated using data on proportion of low-income households, prices, and location charac-teristics at the municipality level ℓ_t, $\mathbf{p}_t$, $\mathbf{x}_t$, where bold letters denote $J \times 1$ column vectors across municipalities.

Given the distributional assumptions on ϵ_{ijt}, the probability that a household of type k who currently lives in municipality $\tilde{m}$ in $t-1$ chooses to live in j in period t is

$$
\mathcal{P}_{\tilde{m}j,t}^k(\ell_t, \mathbf{p}_t, \mathbf{x}_t; \theta^k) := \int_{\iota, \, m_{\iota t-1}=\tilde{m}} \left(\frac{\exp\left(\delta_{jt}^k + u_{\iota jt}^k(\tilde{m}; \beta_\iota^k)\right)}{\sum_{j' \in \mathcal{J}} \exp\left(\delta_{j't}^k + u_{\iota j't}^k(\tilde{m}; \beta_\iota^k)\right)} \right) f(\beta_\iota^k | \theta^k) d\iota, \quad (5)
$$

where $f(\cdot | \theta^k)$ is the density of a bivariate normal distribution parametrized by θ^k. Note that because utility depends where the household lives in period $t-1$, there is a vector of choice probabilities for each $\tilde{m}$.

Given these transition probabilities, the share of households of type k that end up choosing to live in municipality j is

$$
s_{jt}^k(\ell_t, \mathbf{p}_t, \mathbf{x}_t; \theta^k) := \sum_{\tilde{m} \in \mathcal{J}} \frac{N_{\tilde{m}t}^k}{N_t^k} \mathcal{P}_{\tilde{m}j,t}^k(\ell_t, \mathbf{p}_t, \mathbf{x}_t; \theta^k), \quad (6)
$$

where N_t^k is the overall number of households of income group k residing in the metropoli-tan area at time t, $N_{\tilde{m}t}^k$ is the number of households of type k who currently live in munic-ipality $\tilde{m}$. The aggregate housing demand for municipality j at time t is thus

$$
\mathcal{D}_{jt}(\ell_t, \mathbf{p}_t, \mathbf{x}_t; \theta) := \sum_{k \in \mathcal{K}} N_t^k s_{jt}^k(\ell_t, \mathbf{p}_t, \mathbf{x}_t; \theta^k), \quad (7)
$$

where $\theta := \{\theta^k\}_{k \in \mathcal{K}}$ is the parameters vector across income groups.

5.2 Supply and Equilibrium

Private housing is assumed to be supplied inelastically so

$$
\mathcal{S}_{jt}(p_{jt}) = H_{jt}, \quad (8)
$$

where H_{jt} is the total number of non social, private housing units in municipality j at time t. An equilibrium of this model satisfies, for all $j \in \mathcal{J}$,

$$\mathcal{D}_{jt}(\boldsymbol{\ell}_t, \mathbf{p}_t, \mathbf{x}_t; \theta) = \mathcal{S}_{jt}(p_{jt}) \tag{9}$$

$$\ell_{jt} \mathcal{D}_{jt}(\boldsymbol{\ell}_t, \mathbf{p}_t, \mathbf{x}_t; \theta) = \mathcal{D}_{jt}^{\text{low}}(\boldsymbol{\ell}_t, \mathbf{p}_t, \mathbf{x}_t; \theta) + H_{jt}^S, \tag{10}$$

where $\mathcal{D}_{jt}^{\text{low}}(\boldsymbol{\ell}_t, \mathbf{p}_t, \mathbf{x}_t; \theta) := N_t^{\text{low}} s_{jt}^{\text{low}}(\boldsymbol{\ell}_t, \mathbf{p}_t, \mathbf{x}_t; \theta^{\text{low}})$ is the housing demand of low-income households left in the private housing market and H_{jt}^S is the number of social housing units in municipality j at time t which is filled by low-income households. Prices adjust and households sort across municipalities in accordance with their preference for proximity to low-income households. In equilibrium, private housing markets clear and the housing demand of low-income households must be consistent with the supply of social housing.

6 Estimation

I quantify the model by adapting Berry et al. (1995) to including limited state dependence with the inclusion of the moving cost parameters which require keeping track of households' most recent decision. The outside option is set to moving out of the Bordeaux metropolitan area which normalized to zero each period. [10]

Step 1: Retrieving Mean Utilities. For every t and income group k, the vector of $J-1$ unknown mean utilities (δ_t^k) can be recovered by inverting equation (6) for each municipality. I estimate mean utilities by matching observed shares of households of type k in each municipality ($\tilde{s}_{jt}^k$) to model predicted share of households ($s_{jt}^k(\boldsymbol{\ell}_t, \mathbf{p}_t, \mathbf{x}_t; \theta^k)$). Given an initial guess of $\delta_t^{k,0}$ and holding fixed nonlinear parameters $\{\gamma_0^k, \gamma_1^k, \Sigma^k\}$, I define the vector sequence

$$\delta_t^{k,n}(\boldsymbol{\ell}_t, \mathbf{p}_t, \mathbf{x}_t; \theta^k) := \delta_t^{k,n-1}(\boldsymbol{\ell}_t, \mathbf{p}_t, \mathbf{x}_t; \theta^k) + \log\left(\tilde{\mathbf{s}}_t^k\right) - \log\left(\mathbf{s}_t^k\left(\boldsymbol{\ell}_t, \mathbf{p}_t, \mathbf{x}_t; \theta^k, \delta_t^{k,(n-1)}\right)\right), \tag{11}$$

---

[10]I take the entry to Bordeaux to be exogenous. When thinking about counterfactuals I revisit and discuss this assumption further.

which BLP shows that it is a contraction mapping. I thus iterate until

$$\max_{j} |\delta_{jt}^{k,n}(\boldsymbol{\ell}_t, \mathbf{p}_t, \mathbf{x}_t; \theta^k) - \delta_{jt}^{k,n-1}(\boldsymbol{\ell}_t, \mathbf{p}_t, \mathbf{x}_t; \theta^k)| \leq \epsilon_{tol}, \tag{12}$$

where ϵ_{tol} is the tolerance set to 10^{-13}. Computing the shares requires approximating the integral in equation (5) to obtain the transition probabilities from state $\tilde{m}$ to municipality j. I use Gaussian quadrature

$$\mathcal{P}_{\tilde{m}j,t}^{k}(\boldsymbol{\ell}_t, \mathbf{p}_t, \mathbf{x}_t; \theta^k, \delta^{k,n}) \approx \frac{1}{\pi} \sum_{r=1}^{R} \sum_{r'=1}^{R} \left(\frac{\exp\left(\delta_{jt}^{k,n} + u_{ijt}(\tilde{m}; \phi_\ell^r, \phi_p^{r'})\right)}{\sum_{j' \in \mathcal{J}} \exp\left(\delta_{j't}^{k,n} + u_{ij't}(\tilde{m}; \phi_\ell^r, \phi_p^{r'})\right)} \omega_\ell^r \omega_p^{r'} \right), \tag{13}$$

where $(\phi_\ell^r, \phi_p^{r'})$ and $(\omega_\ell^r, \omega_p^{r'})$ are the quadrature points and quadrature weights for $\beta_{i,\ell}$ and $\beta_{i,p}$ respectively, and R is the number of quadrature nodes.[11]

Step 2: Decomposing Mean Utilities. Taking $\widehat{\delta_t^k}$ as given, define ν_{jt}^k as the deviation between the mean utility of group k for living in municipality j previously estimated from the one implied by the preference parameters

$$\nu_{jt}^k = \widehat{\delta_{jt}^k} - \left(\bar{\beta}_\ell^k \ell_{jt} + \bar{\beta}_p^k p_{jt} + \beta_x^k x_{jt} + \xi_j^k \right). \tag{14}$$

For every group $k \in K$, I estimate θ_k using four sets of moment conditions. First, to identify the price coefficient $\bar{\beta}_p^k$ I use optimal instruments Z_{jt} formed from attributes of neighborhoods between 3 and 5 miles away, discussed in more detail in the identification section. Then since the model implies $E[Z_{jt}' \nu_{jt}^k] = 0$, I form the moments:

$$g_1(\theta) = \frac{1}{JT} \sum_{j,t} Z_{jt} \nu_{jt}^k. \tag{15}$$

Second, to identify the preference of living close to low-income residents $\bar{\beta}_\ell^k$, I exploit the discontinuity induced by the SRU policy. Municipalities with a population above the threshold were required to build more social housing. Since social housing is occupied by low-income households, this policy led to a discrete increase in ℓ_{jt} for the treated

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[11]The model is estimated with 15 quadrature nodes for each variable, or 225 pairs.

municipalities, and in response affected the inflows of population. For each income category k, define the share of households moving to municipality j as

$$I_{jt}^k(\boldsymbol{\ell}_t, \mathbf{p}_t, \mathbf{x}_t; \theta^k) := \sum_{\tilde{m} \in \mathcal{J} \setminus j} \frac{N_{\tilde{m}t}^k}{N_{t,\gamma}^k} \mathcal{P}_{\tilde{m}j,t}^k(\boldsymbol{\ell}_t, \mathbf{p}_t, \mathbf{x}_t; \theta^k), \tag{16}$$

Where $N_{t,\gamma}^k$ is the total number of movers of type k in year t. To isolate exogenous changes in ℓ_{jt}, I compare the average population inflows between treated and control municipalities each year

$$\Delta I_t^{k,\text{SRU}} := \frac{1}{|\mathcal{J}^\tau|} \sum_{j \in \mathcal{J}^\tau} I_{jt}^k - \frac{1}{|\mathcal{J}^c|} \sum_{j \in \mathcal{J}^c} I_{jt}^k,$$

where $\mathcal{J}^c$ and $\mathcal{J}^\tau$ are the sets of control and treated municipalities, respectively. I then define the moment condition to match these model-predicted flows induces by the policy to observed population flows in the data:

$$g_2(\theta) = \Delta I_t^{k,\text{SRU}} - \Delta \widetilde{I}_t^{k,\text{SRU}}, \tag{17}$$

where $\Delta \widetilde{I}_{jt}^{k,\text{SRU}}$ is defined as in equation (6) using empirical inflows ($\widetilde{I}_{jt}^k$).

Third, to identify the moving cost parameters γ_0^k and γ_1^k, I match the model-predicted average move rate and average move distance within each income group k to their empirical counterparts

$$g_3(\theta) = \frac{N_{t,\gamma}^k}{N_t^k} - \frac{\widetilde{N}_{t,\gamma}^k}{N_t^k} \tag{18}$$

where $\widetilde{N}_{\tilde{m}t}^k$ is the number of type-k households from municipality $\tilde{m}$ who are observed to move, $\widetilde{N}_{t,\gamma}^k$ is the total number of movers in the data. The last moving related moment matches the average distance moved implied by the model to the average distance observed in the data:

$$g_4(\theta) = \sum_{j \in \mathcal{J}} \left(\frac{N_{jt}^k}{N_{t,\gamma}^k} \sum_{\tilde{m} \in \mathcal{J} \setminus j} \left(\frac{N_{\tilde{m}t}^k}{N_t^k} \mathcal{P}_{\tilde{m}j,t}^k(\boldsymbol{\ell}_t, \mathbf{p}_t, \mathbf{x}_t; \theta^k) d_{\tilde{m}j} \right) \right) - \sum_{j \in \mathcal{J}} \left(\frac{\widetilde{N}_{jt}^k}{\widetilde{N}_{t,\gamma}^k} \sum_{\tilde{m} \in \mathcal{J} \setminus j} \left(\frac{\widetilde{N}_{\tilde{m}t}^k}{\widetilde{N}_{t,\gamma}^k} d_{\tilde{m}j} \right) \right), \tag{19}$$

where $d_{\tilde{m}j}$ is the distance between municipalities $\tilde{m}$ and j.

Fourth, since the preference parameters on municipalities characteristics β_x are assumed to be exogenous, they should be uncorrelated with v_{jt}^k so

$$g_5(\theta) = \frac{1}{JT} \sum_{j,t} x_{jt} v_{jt}^k \tag{20}$$

Finally, I gather moment conditions (15), (17), (18), (19), and (20) into the criterion function

$$q(\theta) \equiv g(\theta)' W g(\theta) \tag{21}$$

where

$$g(\theta) = \begin{bmatrix} g_1(\theta) \\ g_2(\theta) \\ g_3(\theta) \\ g_4(\theta) \\ g_5(\theta) \end{bmatrix}$$

and W is the weighting matrix. I use simulated method of moments to find the set of nonlinear and linear preference parameters θ that minimize the objective function.

7 Identification

The model is estimated with the population split into three observable groups based on household income.[12] low-income households have combined household income below the 30th percentile of household earnings, middle-income households are between the 30th and 70th income percentile and high-income households have yearly income above the 70th percentile defined yearly at the national level. I estimate the model separately for each income group, thus preference coefficients as well as moving cost parameters are

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[12]One could add additional observable heterogeneity here but the smaller the groups, the higher the risk you end up with municipalities with inflows very close to zero since municipalities are often small and segregated.

group specific.

Instrument   With demand estimation, there are two potential sources of endogeneity. The first is common in multinomial choice models, price is usually correlated with unobserved quality. Since unobserved quality cannot be directly controlled for, the coefficient on price will be biased upwards which can even result in a positive coefficient on price. In particular the exclusion restriction requires that the changes in the instruments must be uncorrelated with the changes in unobserved heterogeneity while relevance requires the changes in the instruments is correlated with changes in price.

To address this, following Bayer et al. (2007) and Berry et al. (1995) I form instruments based on average characteristics of nearby but not adjacent municipalities. They utilize the fact that these houses in farther neighborhoods, act as substitutes for houses in the immediate area. As these farther houses become more attractive, this should influence the price. I therefore construct a set of instruments for price leveraging this idea by looking at average and median housing characteristics of municipalities three to five miles away from the municipality's centroid. Specifically I use, the proportion of 1 bedrooms, the proportions of 2 bedrooms, the proportion of houses built before 1930 and the proportion build after 2000. From this set, I calculate optimal instruments to use in estimation following CITE(Chamberlain 1987). This approach is in line with current literature Bayer et al. (2007); Park (2024); Almagro et al. (2023).

The second source of endogeneity comes from the link between the share low-income and unobserved quality. The proportion of a municipality's population that is low-income is itself a result of an endogenous sorting pattern and one might imagine it could also be negatively correlated with unobserved neighborhood quality. In fact, because low-income housing is built as the result of a political process, even changes in the low-income housing could be correlated with changes in unobserved heterogeneity. The advantage of this policy is that whether a municipality is assigned to build more social housing or not is a deterministic function of its population size and locally uncorrelated with unobserved municipality quality around the treatment threshold. Here I will leverage the policy to get a quasi-experimental shift in the proportion low-income.

8 Results

The results from estimating the model are presented in Table 2. The first column presents the results for low-income residents, below the 30th percentile nationally, the second column presents the results for the middle-income residents, between the 30th and 70th percentile nationally, and the third column for the high-income residents, above the 70th percentile nationally. Regardless of income, all households dislike paying more for housing.

high-income residents dislike living in municipalities with a high share of low-income residents. The willingness-to-pay estimates implies if the low-income share were to increase by 20 percentage point high-income households are willing to pay 19% *less* to live in that municipality. Given the average median monthly rent of a high-income household in Bordeaux in 1999, this works out to be 538 euros less per month. middle-income residents also dislike living in areas with a high low-income share with a willingness-to-pay that implies decreasing monthly rent by 522 euros per month. Finally low-income households prefer to live in municipalities with a high share of low-income households, if the low-income share increases by 20 percentage points they are willing to pay 0.13% *less* per month or about 352 euros less per month.

Of course the exact source of the disutility that high and middle-income households have with living in municipalities with high shares of low-income households in not clear from the estimated parameters. Of course, it cannot be concluded that this is directly driven by classism, it could be driven by changes in endogenous amenities (Almagro and Domínguez-Iino (2025)), changes in proportion of non-white residents (Schmutz and Verdugo (2023); Levasseur (2016); Almagro et al. (2023)) or changes in school quality (Allende (2021)), to name a few.

There is another important caveat which is the preferences are estimated using the policy discontinuity which implies it is true for municipalities with a population size in 1999 of around $3,500$. There are reasons to think that this may be weaker in larger municipalities who are better able to segregate their social housing within their own borders, which they endeavor to do Chapelle et al. (2022). For the largest municipalities, such as Paris, the SRU fraction is required at the *arrondissement*, or administrative district level. Even still the districts have much larger populations than the threshold. For the counterfactual, it is important to keep in mind that the strategic income segregation of larger

municipalities is assumed to be limited to what is possible around the $3,500$ threshold.

There is perhaps a similar concern for smaller communes, that smaller communes might be less able to strategically segregate their social housing and an increase in the fraction low-income could therefore have a larger effect on utility.

9 Counterfactuals

This framework is flexible enough to consider a wide variety of counterfactual policies, I focus on three scenarios. In the first I explore what socioeconomic segregation would look like if the SRU had never been implemented. In the second, I consider what if there was no discretion and holding fixed the total amount of housing, the municipalities build proportionally to their SRU obligation. Finally I consider shutting down the secondary re-sorting and consider how much location choices of the residents are driving the policy impact.

The equilibrium solver follows Almagro et al. (2023). Recall that, at a given date t, an equilibrium of the model is a vector of J prices $\mathbf{p}_t^*$ and J shares of low-income households $\boldsymbol{\ell}_t^*$ which satisfy, for all $j \in \mathcal{J}$,

$$\mathcal{D}_{jt}(\boldsymbol{\ell}_t^*, \mathbf{p}_t^*, \mathbf{x}_t; \theta) = H_{jt} \tag{22}$$

$$\ell_{jt}\mathcal{D}_{jt}\left(\boldsymbol{\ell}_t^*, \mathbf{p}_t^*, \mathbf{x}_t; \theta\right) = \mathcal{D}_{jt}^{\text{low}}(\boldsymbol{\ell}_t^*, \mathbf{p}_t^*, \mathbf{x}_t; \theta) + H_{jt}^S, \tag{23}$$

Dropping the time subscript, I proceed by forming an excess demand function for housing and socioeconomic composition

$$\mathcal{EDH}(\boldsymbol{\ell}, \mathbf{p}, \mathbf{x}; \theta) = \begin{bmatrix} \mathcal{D}_1(\boldsymbol{\ell}, \mathbf{p}, \mathbf{x}; \theta) - H_1 \\ \vdots \\ \mathcal{D}_J(\boldsymbol{\ell}, \mathbf{p}, \mathbf{x}; \theta) - H_J \end{bmatrix} \tag{24}$$

$$\mathcal{EDL}(\boldsymbol{\ell}, \mathbf{p}, \mathbf{x}; \theta) = \begin{bmatrix} \ell_1 \mathcal{D}_1\left(\boldsymbol{\ell}, \mathbf{p}, \mathbf{x}; \theta\right) - \mathcal{D}_1^{\text{low}}(\boldsymbol{\ell}, \mathbf{p}, \mathbf{x}; \theta) - H_1^S \\ \vdots \\ \ell_J \mathcal{D}_J\left(\boldsymbol{\ell}, \mathbf{p}, \mathbf{x}; \theta\right) - \mathcal{D}_J^{\text{low}}(\boldsymbol{\ell}, \mathbf{p}, \mathbf{x}; \theta) - H_J^S \end{bmatrix}. \tag{25}$$

Note that a necessary and sufficient condition for $\boldsymbol{\ell}^*$ and $\mathbf{p}^*$ to be an equilibrium of the

model is that $\mathcal{EDH}(\boldsymbol{\ell}^*, \mathbf{p}^*) = \mathcal{EDL}(\boldsymbol{\ell}^*, \mathbf{p}^*) = 0$.

Solving for an equilibrium   Taking $\mathbf{x}$, H^S, θ as given and starting from some initial guess $\mathbf{p}^{(0)}$, $\boldsymbol{\ell}^{(0)}$, I solve for a fixed point by evaluating $\mathcal{EDH}^{(n)}$ and $\mathcal{EDL}^{(n)}$ at $\mathbf{p}^{(n)}$, $\boldsymbol{\ell}^{(n)}$ and updating as

$$\mathbf{p}^{(n+1)} = \mathbf{p}^{(n)} + \tau.\mathcal{EDH}^{(n)} \tag{26}$$

$$\boldsymbol{\ell}^{(n+1)} = \boldsymbol{\ell}^{(n)} + \tau.\mathcal{EDL}^{(n)}, \tag{27}$$

until $\max\{\max_j \mathcal{EDH}^{(n)}; \max_j \mathcal{EDL}^{(n)}\} \leq 10^{-13}$ and τ a tuning parameter set to 0.1. If τ was set higher, the solver would converge generally faster at the expense of stability. This updating rule works because if $\mathcal{EDH}_j^{(n)}$ is positive, municipality j is too attractive and the next price $p_j^{(n+1)}$ needs to be higher to make it less attractive. Simultaneously if $\mathcal{EDL}^{(n)}$ is positive then more low-income residents want to live in municipality j than is suggested by $\ell_j^{(n)}$ so $\ell_j^{(n+1)}$ needs to be higher.

Full Local Discretion   I first construct a counterfactual benchmark to analyze the distribution of socioeconomic segregation absent the SRU law. This scenario is simulated by removing all social housing units attributable to the mandate. This "full discretion" counterfactual, wherein municipalities retain complete autonomy over social housing development, serves as a baseline against which the policy's impact is evaluated.

Figure 12 plots the histogram of the low-income household share per municipality. The blue distribution represents the "full discretion" counterfactual, while the red distribution depicts the observed equilibrium under the SRU. Two differences are particularly salient. First, the counterfactual distribution exhibits a significant mass of municipalities clustered just below the 0.2 statutory threshold. The implementation of the SRU appears to shift this mass above the threshold, resulting in a corresponding increase in the density within the $0.25 - 0.35$ range. Second, the SRU is associated with a slight increase in the proportion of municipalities with very low shares of low-income households (i.e., < 0.13). This suggests the policy may inadvertently exacerbate residential sorting in some jurisdictions. From this descriptive analysis alone, it remains ambiguous whether this latter effect is driven by non-compliant municipalities or by those exempt from the SRU's

provisions.

Distilling the distributional comparison, I find that the absent the SRU segregation would have been higher, the median municipality moves from 24% low-income in the real "partial discretion" world to 21% low-income in the full discretion case.

No Local Discretion The second counterfactual scenario considers what would happen removing all local discretion from compliance with the SRU. To keep it as comparable as possible, I keep total social housing between the current compliance level and the "no discretion" scenario constant, merely reallocating newly created social housing proportionally instead and resolving for equilibrium prices and location choices.

Figure 13 depicts the histogram of low-income shares in the new equilibrium. As one might expect, removing discretion further shifts the distribution to the right, indicating it is reducing the quantity of municipalities that are very segregated with a fraction of low-income residents less than 0.2. Interestingly removing local discretion results in a bimodal distribution with a spike just below 0.25 and another just above 0.4, which means reducing the number of municipalities with fractions of low-income residents below 0.2 seems to be at the cost of increasing the mass above 0.35 after high and middle-income households resort.

In this no discretion scenario socioeconomic segregation in the median municipality decreases, the median municipality moves from 21% low-income in the partial local discretion case to 26% low-income in the no local discretion case.

If instead full compliance with the SRU were considered, where all municipalities subject to the SRU built until they reached at least 20% of the total stock, these results would likely have been even stronger. Similarly, if small municipalities had not been exempt and there was no local compliance, the results would be stronger still.

No re-sorting An interesting correlated question is how much of the reduction in highly segregated municipalities is mechanical, strictly driven by the construction of low-income housing in previously economically segregated municipalities. To that end, one can compare the segregation within and across municipalities before resolving the equilibrium but after reallocating the housing.

Figure 14 depicts the density plot of the previous "no discretion" before and after

resolving for equilibrium. In fact the scenario removing re-sorting has even fewer municipalities with a small fraction of low-income households and more municipalities with high fractions of low-income households. Given the estimated preferences, this indicates that the re-sorting shifts some municipalities farther to the left. The disparity between the two distribution emphasizes the importance of considering re-sorting when thinking about the impact place-based policies could have. Finally I consider how significant the secondary re-sorting is to the observed segregation, and I consider what the distribution of municipalities would look like before resolving for an equilibrium. I find understanding the re-sorting is crucial to understanding the impact of the SRU and place-based policies more generally. Before re-sorting the full mandate would have moved the median treated municipality to 29% low-income from 26% low-income, indicating the spillovers from relocation are an especially important force in housing segregation, since the gains are equally as large as implementing a full mandate.

Multiplicity of equilibria   The uniqueness of the equilbria is not guaranteed, particularly when congestion forces are important to model dynamics. To assess the potential impact of multiple equilibria I follow Almagro et al. (2023); Bayer and Timmins (2005) and consider a wide range of initial conditions. I do not find substantially different equilibria when substantially changing the starting prices, low-income fraction, or initial population. Of course this is not definitive and more can be done to gauge the potential prevalence of multiple equilibria.

10   Conclusion

Central governments are positioned to address issues with national or regional implications, ensuring consistency and equity, while local governments can tailor policies closely to the specific needs and preferences of their communities. Since local and central governments have different goals and information this can create frictions. This conflict of interests is particularly salient in housing, which has historically been under local jurisdictional control, municipalities can restrict what, where, and how housing is constructed. The extent to which housing should remain under local control is an open and active policy debate.

Using a French policy, this paper fills a gap in the literature by exploring the impacts of local discretion on local social housing provision. The impacts of this quasi-voluntary regulation is further complicated by the actions of local residents who, I show, resort in response to municipality social housing construction.

In so-called "fair share" housing policies, central governments erode local control over housing policy through adjusting incentives while preserving some local discretion. While this quasi-voluntary regulation has benefits, allowing municipalities to tailor their policies to the needs of their community, it ultimately substantially undermines the central government's goals of evening affordable housing distribution and reducing income segregation. Wealthier municipalities, more inclined to opt out, reduce overall policy compliance, while wealthier residents further exacerbate residential income sorting, relocating to areas with fewer low-income residents. Together, limited municipal compliance and outward migration of wealthier residents from compliant areas undermine reductions in income segregation.

I estimate a model of location choice, taking advantage of variation induced by the SRU to help identify preferences around living near low-income households. I find all income groups dislike living near low-income households but high-income households dislike it the most, with a willingness to pay of around 19% monthly rents to avoid an 0.2 increase in the share of the population that is low-income. This is compared to the low-income households who are only willing to pay around 13% more monthly to the same increase in the share.

Finally the model is exploited to compare two counterfactual scenarios. In the first, the SRU policy was never implemented and municipalities have full local discretion. I find the SRU reduced the number of municipalities that are very economically segregated - where low-income households make up less than 20% of the population. I find that the absent the SRU segregation would have been higher, the median municipality moves to 24% low-income without the SRU from 21% low-income in the partial discretion scenario.

In the second, I instead consider a scenario with no local discretion, reallocating the social housing created by the SRU proportional to the obligation the municipality had to fulfill. Segregation decreases in the median municipality moving from 21% low-income in the partial local discretion case to 26% low-income in the no discretion case.

Finally I examine how significant the spillovers from residential re-sorting is to the

overall impact. I find that if policy makers fail to account for the re-sorting they will overstate the impact of the policy significantly since the re-sorting undermines segregation goals. If the policy impact were naively estimated without accounting for re-sorting the median municipality would have moved close to perfect socioeconomic integration at 29%, where perfect integration would have been 30%.
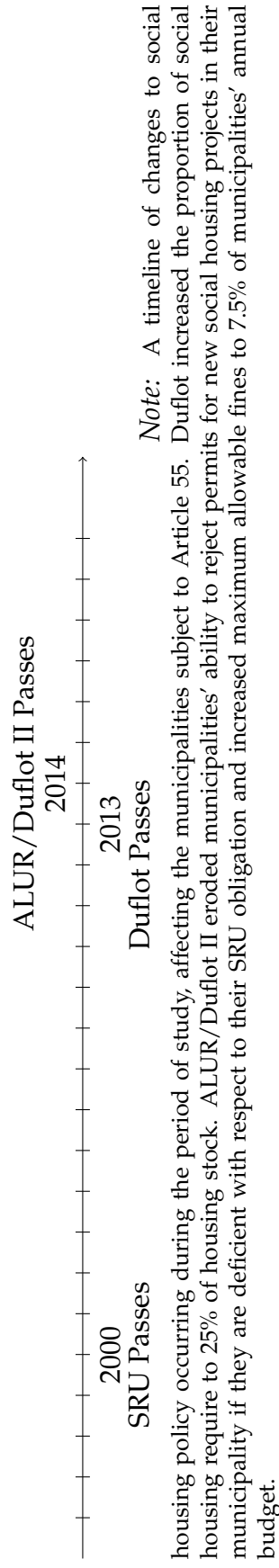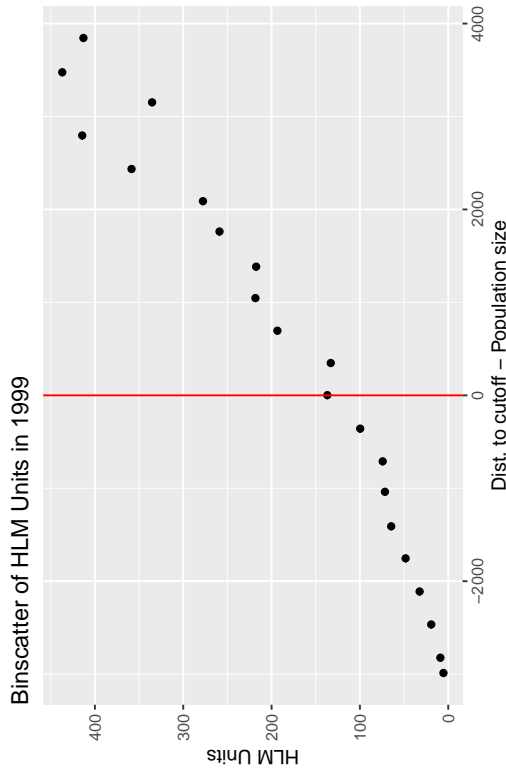
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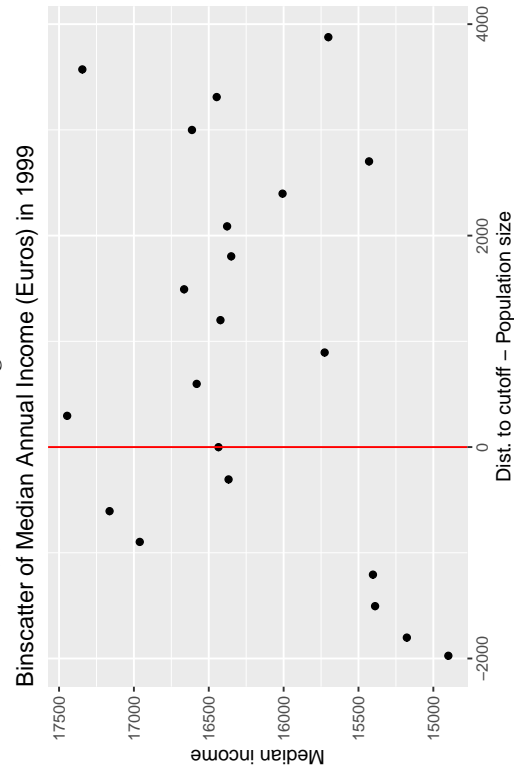
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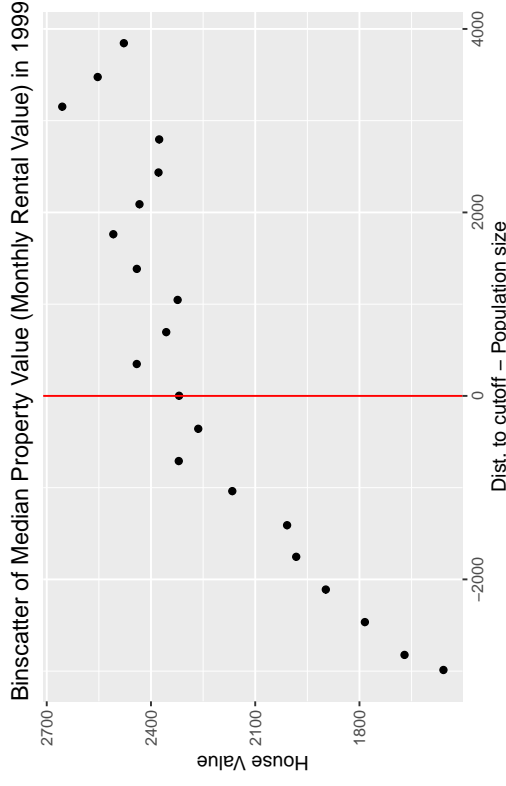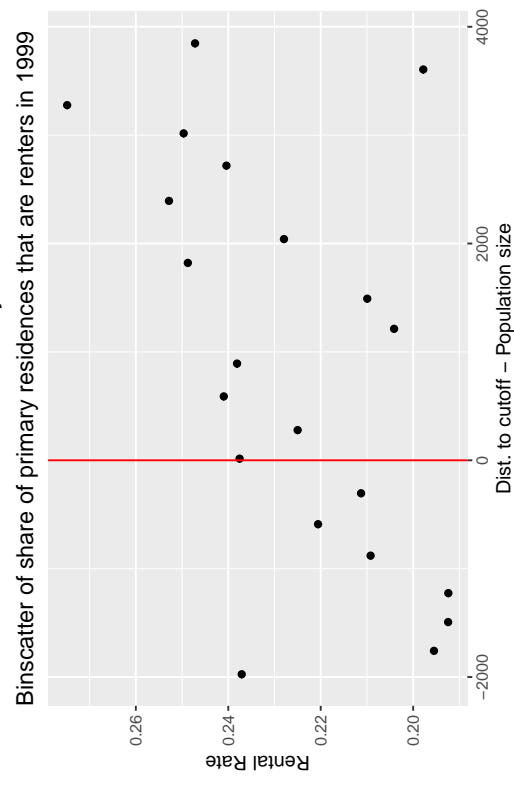
Figure 1: Timeline of SRU Amendments

ALUR/Duflot II Passes
2014

2013
Duflot Passes

2000
SRU Passes

Note: A timeline of changes to social housing policy occurring during the period of study, affecting the municipalities subject to Article 55. Duflot increased the proportion of social housing require to 25% of housing stock. ALUR/Duflot II eroded municipalities' ability to reject permits for new social housing projects in their municipality if they are deficient with respect to their SRU obligation and increased maximum allowable fines to 7.5% of municipalities' annual budget.

Binscatter of Median Property Value (Monthly Rental Value) in 1999

(b) Assessed Monthly Rent

Binscatter of share of primary residences that are renters in 1999

(d) Rental Rate

Binscatter of HLM Units in 1999

(a) Social Housing Units in 1999

Binscatter of Median Annual Income (Euros) in 1999

(c) Household income

Figure 2: Continuity in Covariates

Figure 3: Histogram of municipality population sizes
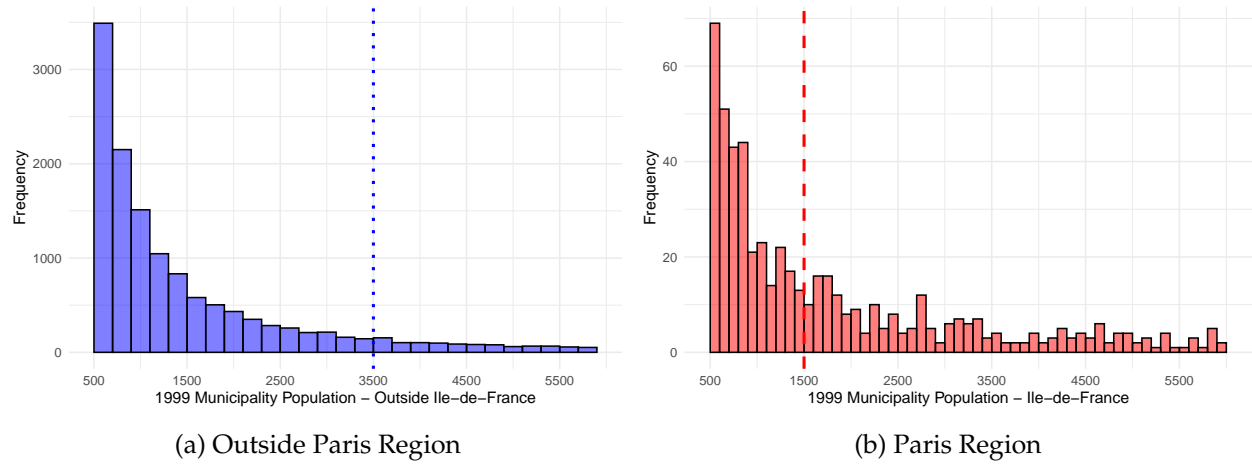
(a) Outside Paris Region　　　　　　　　　(b) Paris Region
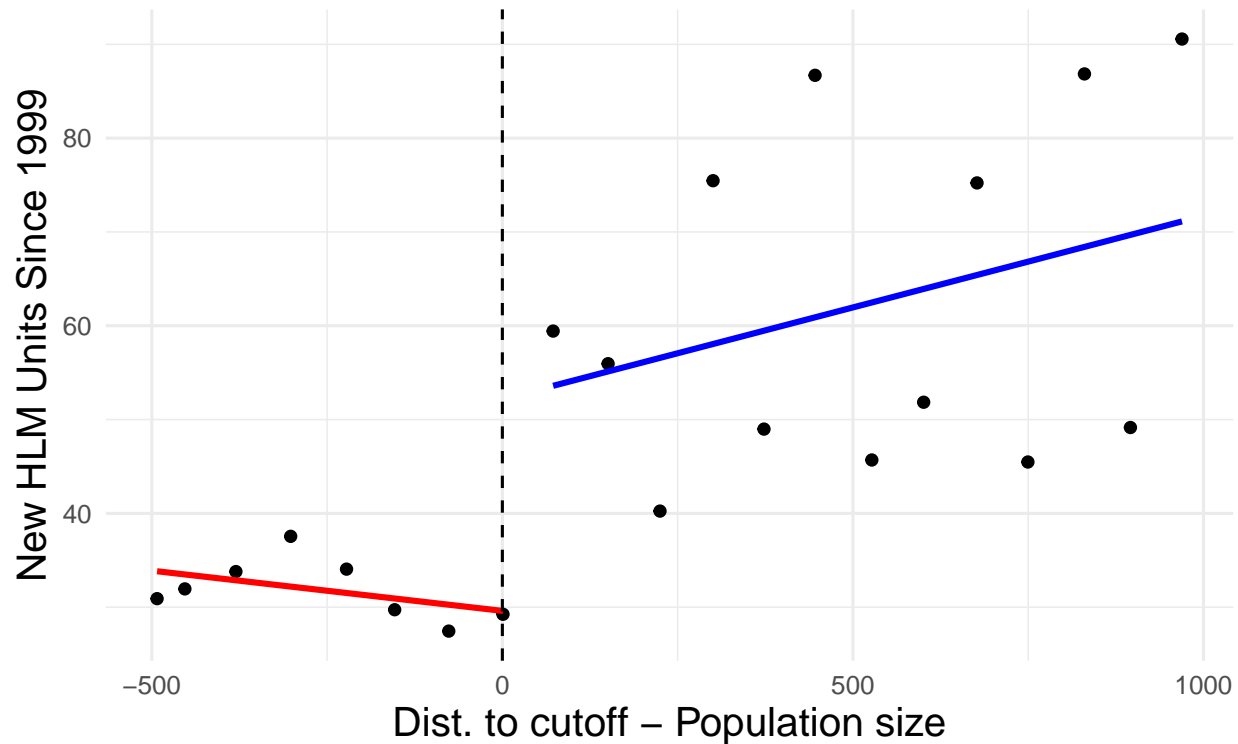
Figure 4: This is a binned scatterplot of the number of new units built by each municipality since the introduction of the policy. The dashed line represents the population threshold and the x-axis is the distance to the population threshold. The municipalities to the left are untreated and the ones to the right are treated by the policy. The red and blue lines represent the lines of best fit.
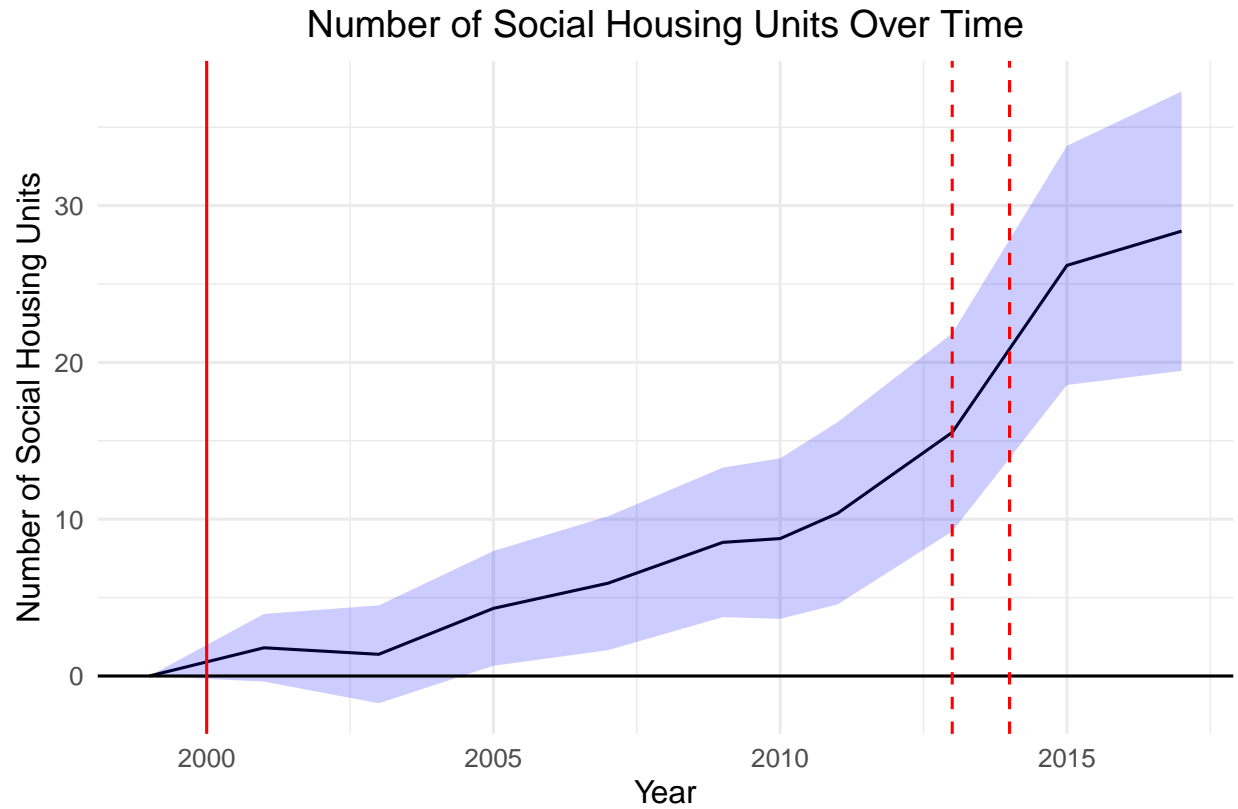
Figure 5: This is the difference between the number of social housing units in the housing stock between treated and control municipalities over time in the regression specification in equation 1. The dark red line represent the introduction of the policy and the two dotted lines mark the subsequent strengthenings of the policy. The shaded portion represents the 95% confidence interval and standard errors are clustered at the municipality level.
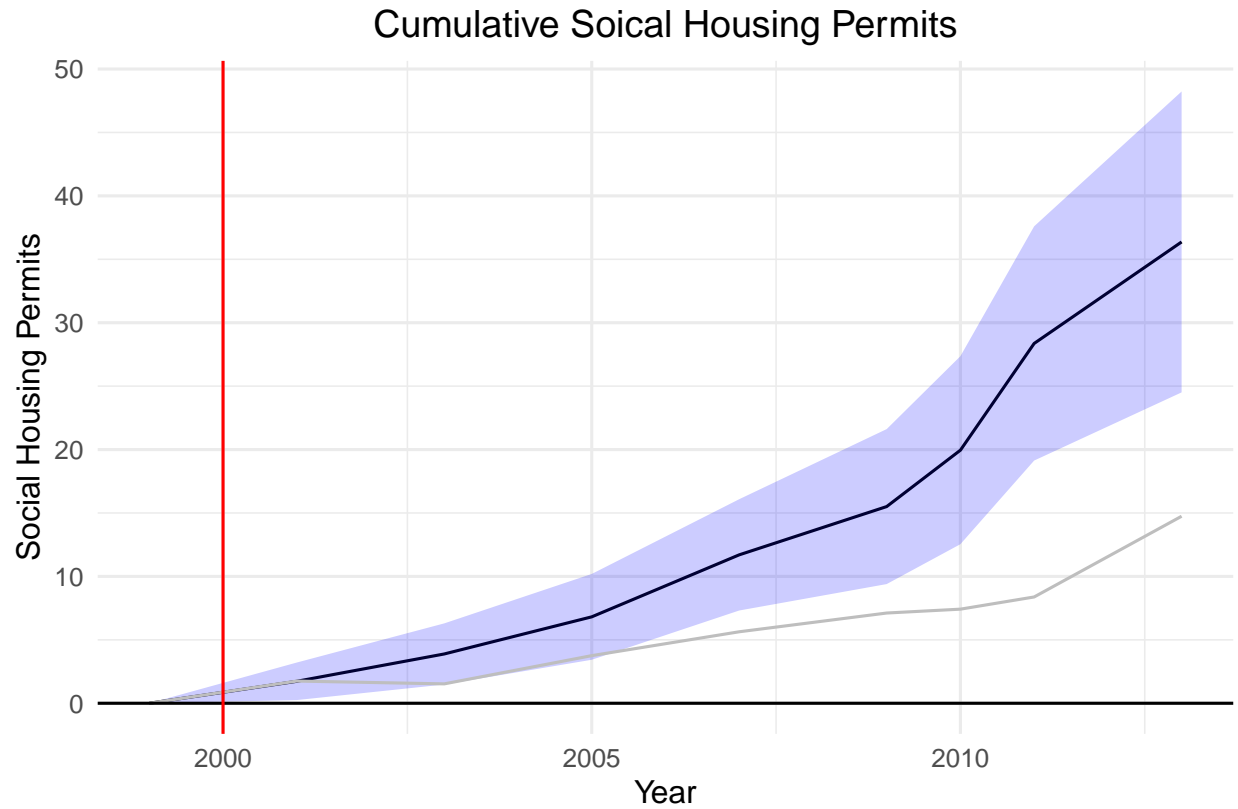
Figure 6: This is the difference between the cumulative number of social housing permits in the housing stock between treated and control municipalities over time in the regression specification in equation 1. The shaded portion represents the 95% confidence interval and standard errors are clustered at the municipality level. The grey line show the coefficients in 5 for reference.
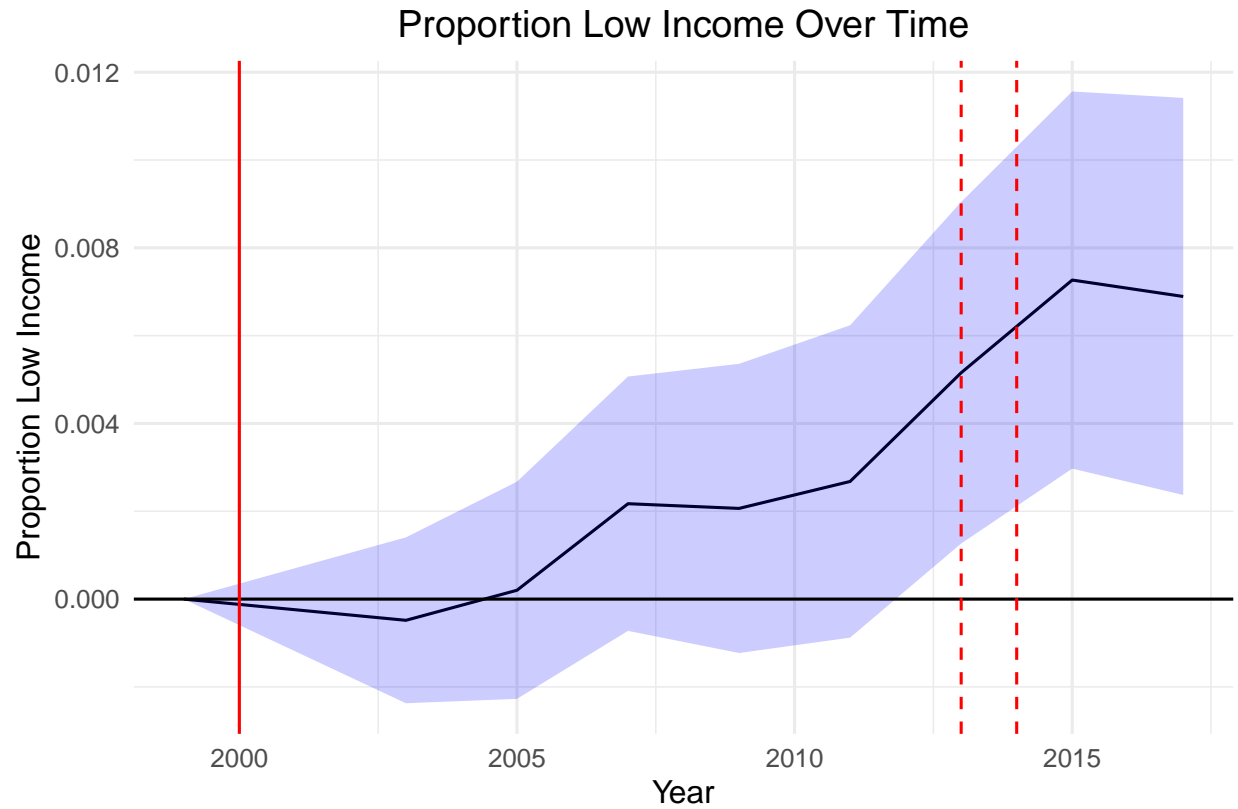
Figure 7: This is the difference in the fraction designated low-income between treated and control municipalities over time in the regression specification in equation 1. The shaded portion represents the 95% confidence interval and standard errors are clustered at the municipality level.

Figure 8: Relationship between municipality income and social housing fractions
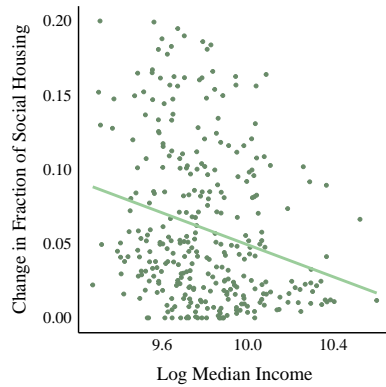
(a) This is a scatterplot with a line of best fit of the the fraction of primary residences that are social housing in 1999 against log median income of the municipality in 1999, restricting the sample to municipalities subject to the SRU.
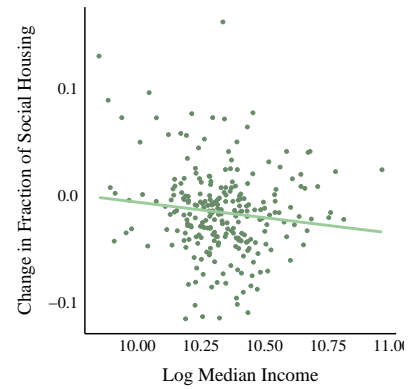
(b) This is a scatterplot of the change in the fraction of primary residences that are social housing between 1999 and 2017 against log median income of the municipality in 1999
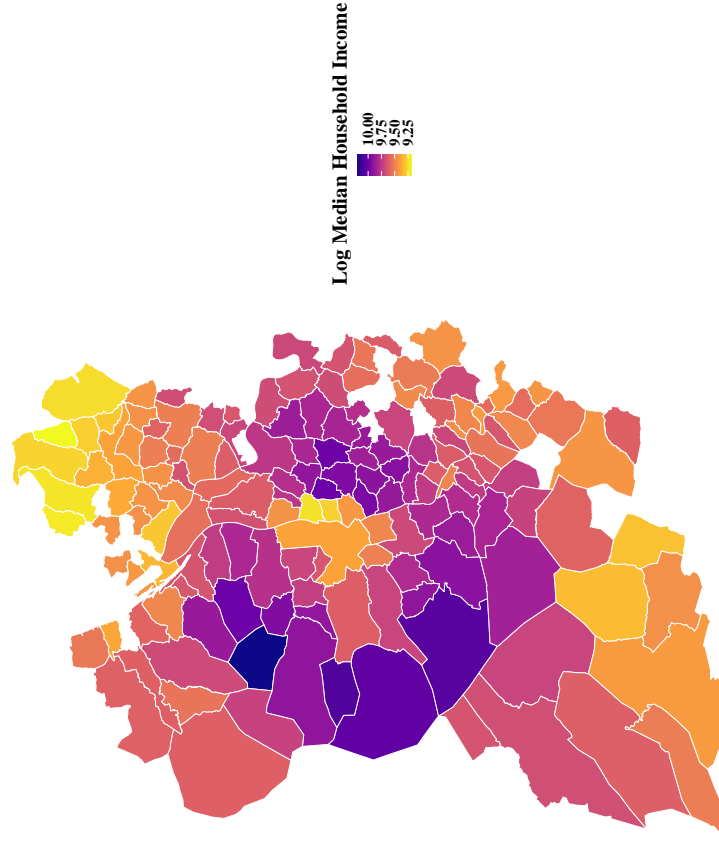
Figure 9: Map of municipalities in Bordeaux commuting area

Fraction Social Housing in 1999
Bordeaux Commuting Zone
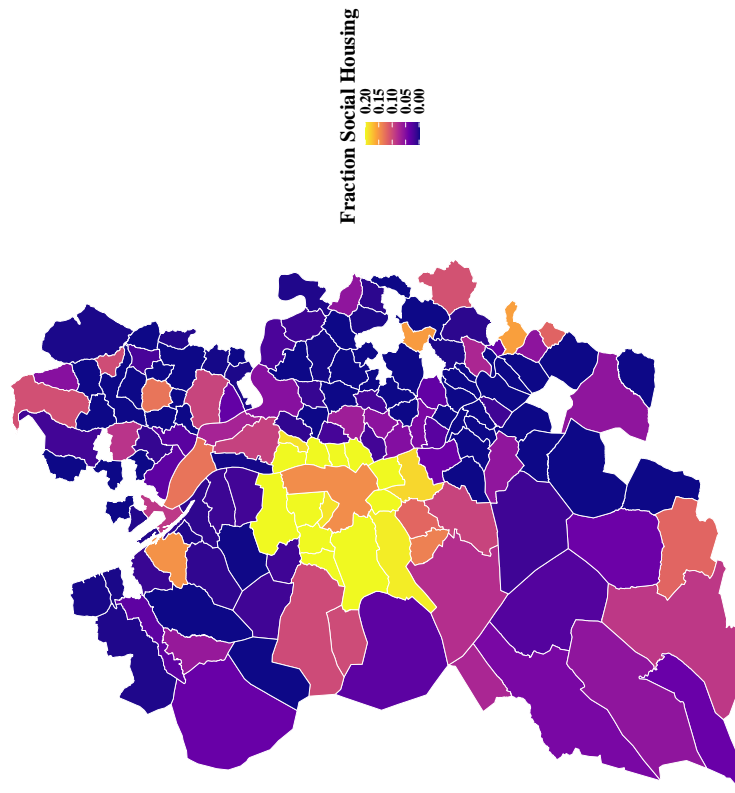
Median Household Income in 1999
Bordeaux Commuting Zone

Fraction Social Housing

0.20
0.15
0.10
0.05
0.00

Log Median Household Income

10.00
9.75
9.50
9.25

(a) Fraction of social housing in 1999
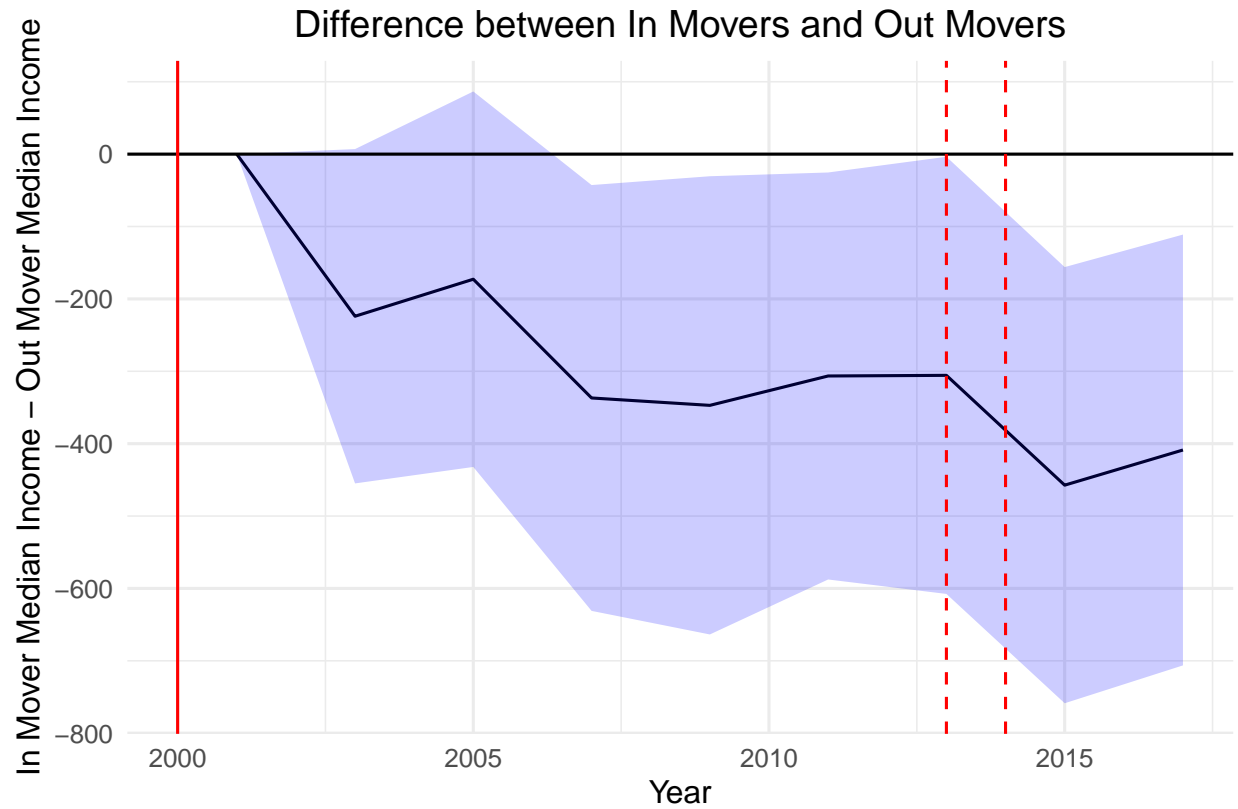
(b) Log Median Household Income in 1999

Figure 10: This is the difference between median household income of in-movers and the median income of out-movers between the control and treated municipalities using coefficients from the regression specification in equation 1. The shaded portion represents the 95% confidence interval and standard errors are clustered at the municipality level.
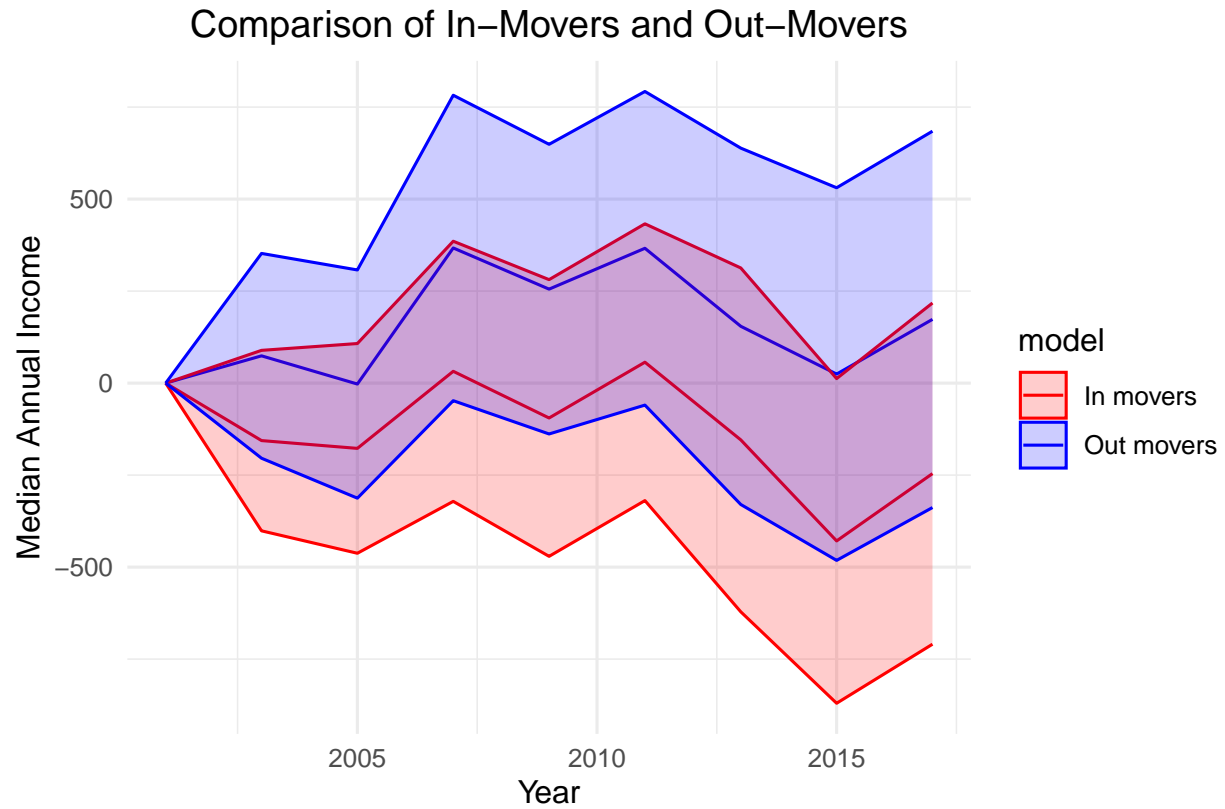
Figure 11: This is the difference between treated and control municipalities in the median household income of in-mover and the median income of outmovers using coefficients from the regression specification in equation 1. The shaded portion represents the 95% confidence interval and standard errors are clustered at the municipality level.
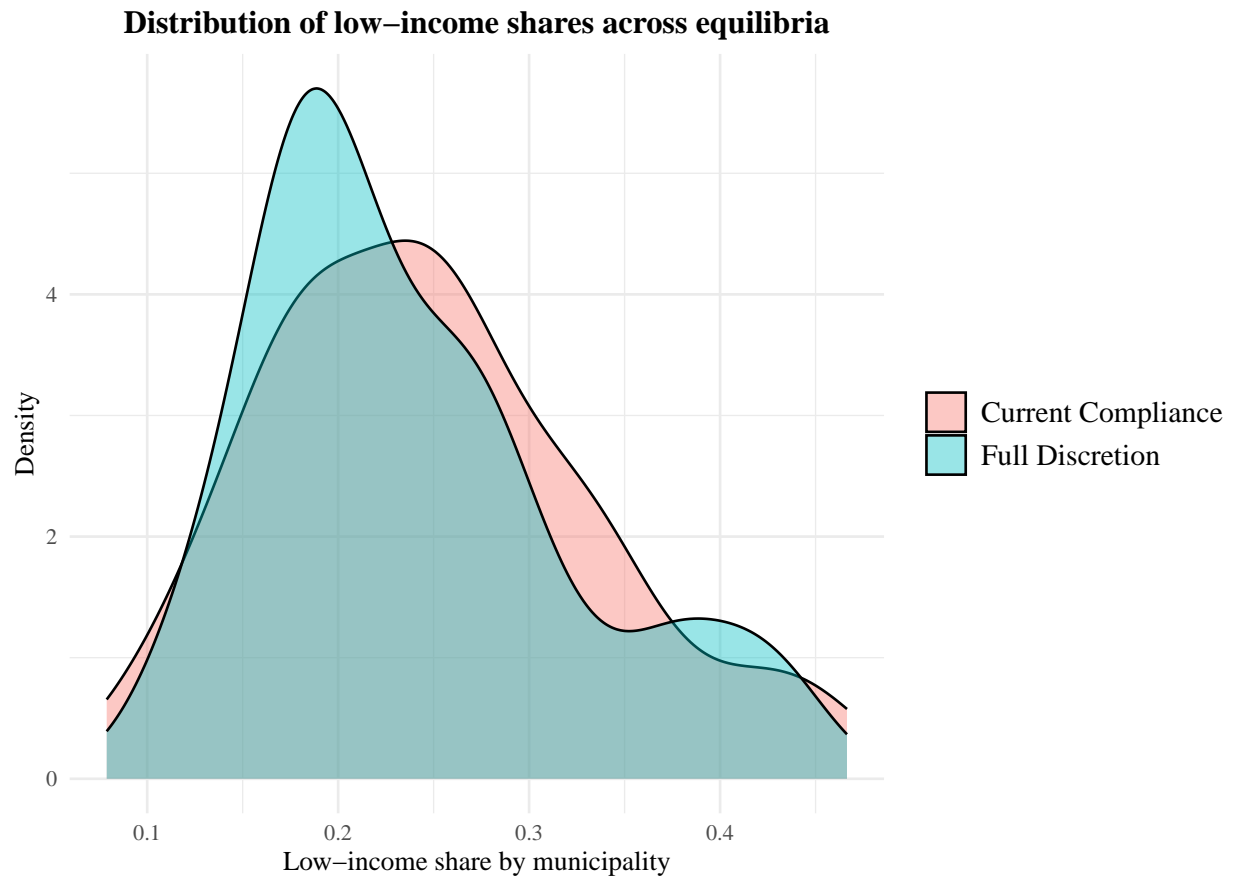
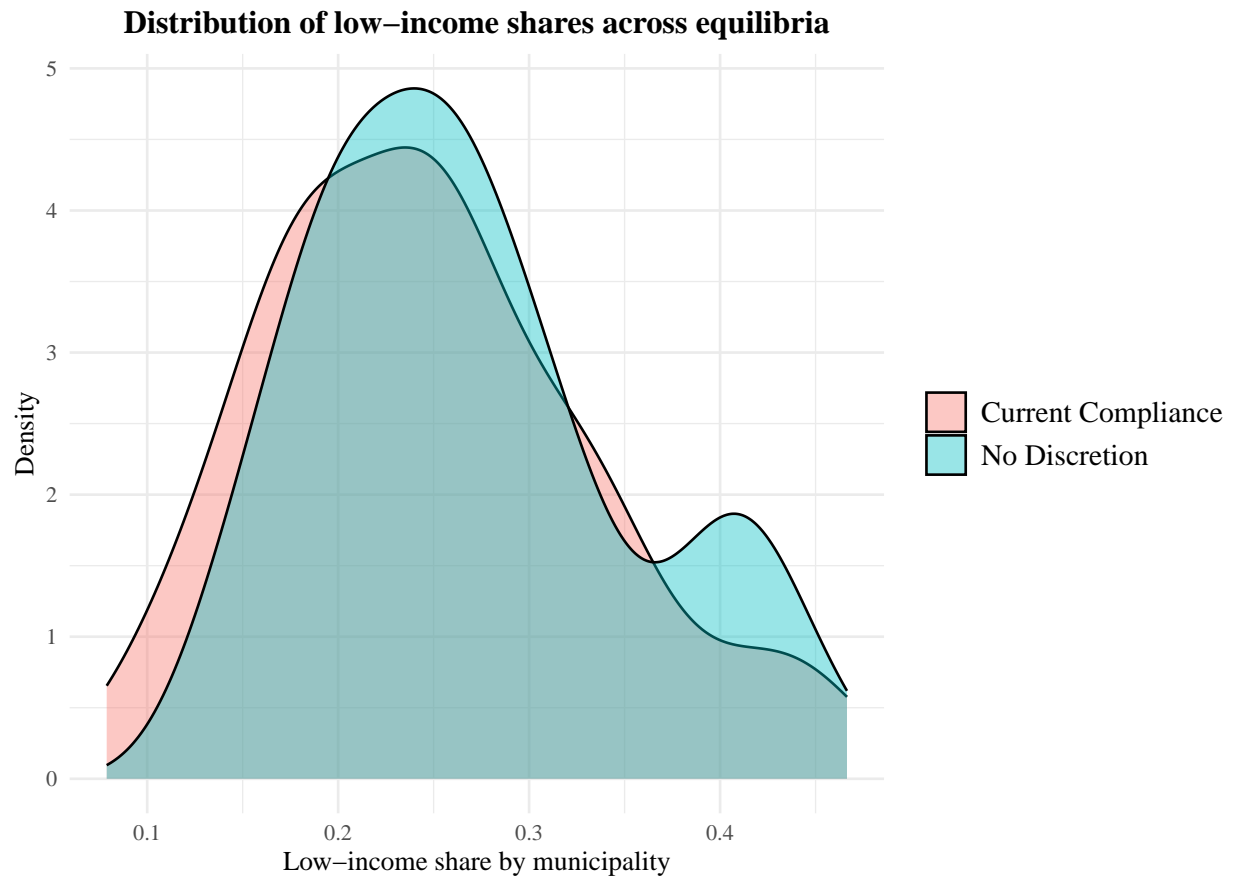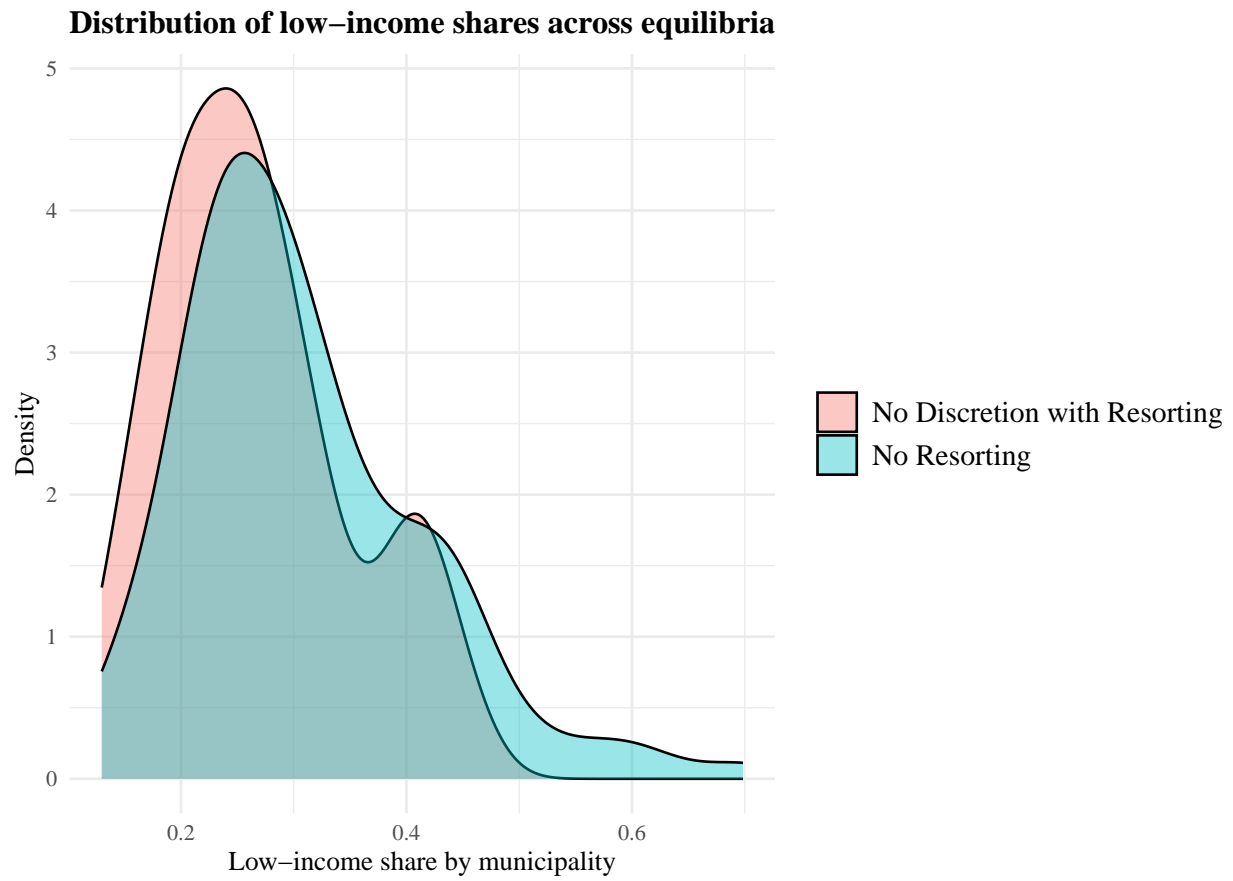**Distribution of low−income shares across equilibria**

Figure 12:

Distribution of low−income shares across equilibria

Figure 13:

Distribution of low−income shares across equilibria

Legend: No Discretion with Resorting / No Resorting

Figure 14:

Table 1: Balance table between treated and control samples

Covariate	Control	Treated	P-Value
Panel A: Paris			
Median Age Occupant	49.5	49.9	0.333
Median Assessed Rent	3,137	3,383	0.160
Median Occupant Income	23,133	24,222	0.123
Median Surface Area (m)	92.1	91.3	0.589
Number of Rooms	4.1	4.2	0.129
Share Owner Occupied	0.793	0.772	0.051
Share Social Housing	0.028	0.038	0.079
Share low-income	0.148	0.133	0.065
Population	1,081	1,809	0.000
N	152	73	
Panel B: Rest of France			
Median Age Occupant	51.2	51.2	0.938
Median Assessed Rent	2,277	2,410	0.008
Median Occupant Income	16,825	16,911	0.748
Median Surface Area (m)	88.8	88.2	0.312
Number of Rooms	4.0	4.0	0.791
Share Owner Occupied	0.715	0.698	0.019
Share Social Housing	0.061	0.067	0.190
Share low-income	0.233	0.231	0.759
Population	3,107	3,810	0.000
N	384	246	

Note: This is a balance table comparing the average attributes of the control municipalities to the average attributes of the treated municipalities and does t-test difference of means. Treated and control are defined as within 700 people of the population threshold. The panel is split by municipalities in the Paris region and the rest of the country since they faced different population thresholds. Most differences are not statistically significant with the exception of population size, which follows from the fact that by construction the municipalities subject to the law are larger than those that are not. The difference between the mean of Share Owner Occupied and Median Assessed Rent are both statistically significantly different in the rest of France, treated municipalities have

Table 2: Model Estimates: Municipality Preference Parameters

	Preference parameters by income group		
	low-income (1)	middle-income (2)	high-income (3)
Log median rent $\bar{\beta}$	-1.907	-1.917	-1.905
low-income share $\bar{\beta}$	-1.434	-2.025	-2.034
Log median rent σ	X	X	X
low-income share σ	X	X	X
Specifications include:			
Tract Fixed Effects	✓	✓	✓
Log median number of rooms	✓	✓	✓
Log median year built	✓	✓	✓
Homeownership share	✓	✓	✓
Observations (tract-by-year)	945	945	945
Number of tracts	105	105	105

Notes: This table presents regression results of preference parameters for a logit location choice model using household characteristics estimated on municipalities in the Bordeaux commuting zone. The model is estimated separately by income group. low-income is defined as below the 30th percentile nationally, middle-income is between 30th and 70th percentile nationally, and high-income is above the 70th percentile nationally. Log median rent is instrumented following Bayer et al. (2007). low-income share is identified using the change in group-specific in-migration between treated and control municipalities subject to the SRU close to the population threshold.