Tourism Policy

ISSN: 2146-4553

available at http: www.econjournals.com

Tourism Policy, 2025, 1(2), 10-16.

A Data-Driven Framework for Tourism Accommodation Policy: Managing Neighbourhood Level Visitor Pressure through Short-Term Rental Analytics

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Received: 20 September 2025 **Accepted:** 02 December 2025 **DOI:** https://doi.org/10.32479/tp.24016

ABSTRACT

Short-term rentals shape where visitors stay, how accommodation demand is distributed across neighbourhoods, and how tourism pressure is dispersed within major cities. Yet policy responses are still often grounded in platform snapshots, citywide totals, or ex post housing arguments, leaving destination managers with limited neighbourhood-level tools for accommodation governance. This paper develops a data-driven framework for tourism accommodation policy based on administrative registry data and illustrates it with the New York City short-term rental registration-and-listing dataset reported in the city's FY25 registration materials. The framework proceeds in four stages. First, it distinguishes legal market entry from observed market activation by linking active registrations to advertised listings. Second, it constructs neighbourhood-level measures of accommodation scale, intensity, platform dependence, and renewal vulnerability. Third, it combines these dimensions into a tourism accommodation pressure score designed for destination management rather than generic compliance monitoring. Fourth, it evaluates alternative area prioritisation rules under fixed policy capacity. In the case study, the legal market contains 3,194 registered active listings linked to 3,073 visible listings, indicating that 22.6% of active registrations were not connected to a visible listing in the published data. Spatial concentration is substantial: the Gini coefficient for advertised listings across ZIP codes is 0.560, and the ten largest ZIP-code markets account for 30.0% of attached listings. Platform dependence is also pronounced, with 95.2% of attached listings attributable to Airbnb. Policy simulation further shows that prioritisation by the composite pressure score captures 49.7% of registrations expiring within 180 days when 20 ZIP codes can be targeted, compared with 43.4%under volume-only targeting and 18.6% under random selection. The findings show how administrative short-term rental records can be translated into a practical tourism policy instrument for balancing accommodation supply, neighbourhood stability, and selective intervention.

Keywords: Tourism Accommodation Policy, Short-term Rentals, Destination Governance, Urban Tourism, Neighbourhood Pressure, Policy Analytics
JEL Classifications: L83

1. INTRODUCTION

The short-term rental markets have been integrated in policy framework of urban tourism. These influence the geography of visitor accommodation, transform the interface between residential neigh bourhoods and tourism demand, and redistribute the source of destination benefits and pressures in cities (Bei and Celata, 2023; Milano et al., 2024; Voltes-Dorta, 2025). In high-density cities, the policy dilemma is no longer about whether short-term housing is to be allowed or not. It has grown to be a more general issue of tourism accommodation government: the locus of visitor serving housing provision, the stability of that provision over time, and the need of local markets to receive differentiated regulatory treatment.

This change has heightened the necessity of operationally useful evidence on the level of the neighbourhood. Although existing studies have created valuable data on professionalisation, regulation, housing impacts, and spatial concentration, much of it

is currently based on scraped platform data or on citywide market performance following policy actions that are already implemented into effect (Iacovone, 2023; Lee and Kim, 2023; Stojčić et al., 2024). These methods have some value in terms of elucidation, but they are less helpful to the real-world policy challenge of visitor accommodation management in actual urban contexts. The destination managers should be able to understand not only the size of the short-term rental market, but also the submarkets that are currently operating, those ones that are weak and those that are likely to produce disproportionate tourism impact.

Empirical opportunity is another empirical opportunity created by administrative registries. When a city is in need of formal registration, the records available in the public may be able to expose the legal accommodation stock in manners that are useful in the destination management as opposed to a retrospective assessment. The data available in the registries enable it to differentiate between legal involvement and visible market action, detect local clusters of high accommodation levels, and give priority to neighbourhoods in policy consideration based on clear rules. Short-term rental registries are, in that regard, not the tools of enforcement only. They also can serve as prospective tourism policy information infrastructures.

This paper builds a general policy-analytics framework for tourism accommodation management and illustrates it using the New York City short-term rental registration-and-listing dataset documented in the city's FY25 registration reporting materials. New York City is an appropriate empirical case because it is a large, policy-relevant urban destination with publicly released administrative short-term rental records detailed enough to support neighbourhood-level analysis. The paper does not treat New York City as exceptional; rather, it uses the case to show how registry records can be mapped onto a transferable framework for evaluating neighbourhood-level visitor accommodation pressure.

The research has three contributions. First, it transforms the administrative short-term rental documentation into a resource of tourism policy by separating legal registration and market activation and connecting the structure of registries to destination-management inquiries. Second, it derives a neighbourhood-scale tourism accommodation pressure score that incorporates scale, listing intensity, platform dependence and renewal vulnerability into a policy metric that can be read. Third, it tests alternative area-prioritisation rules with fixed policy capacity, which reveals that alternative allocation logics give preference to alternative policy objectives. The findings thus not only address regulation, but also the formulation of selective, place-sensitive tourism accommodation policy.

The rest of the paper will be structured in the following manner. Section 2 reviews recent work on short-term rental governance and tourism accommodation pressure. Section 3 introduces the case setting, data, and analytical framework. Section 4 presents the empirical results. Section 5 discusses the implications for tourism policy and destination management. Section 6 concludes.

2. TOURISM ACCOMMODATION GOVERNANCE AND ANALYTICAL MOTIVATION

Recent research has shifted the short-term rental research out of the initial platform-versus-hotel debate to questions of governance, city distribution, and policy efficacy. The first branch of the literature evaluates the effect of regulation on the market of short-term rental and whether lawful restrictions are converted into real spatial decongestion. Comparative analysis indicates that regulation may decrease the pressure of supply and professionalisation but it is more challenging to generate balanced spatial results than to decrease the total activity (Bei and Celata, 2023). Other research on destinations with high pressure, including Barcelona, also indicates that implementation capacity, verification, and follow-up are at least as important as formal rule design (Bei, 2025; Gyódi et al., 2025).

A second stream is based on host heterogeneity and market structure. Iacovone (2023) find several types of professionalisation in Southern European cities and posit that not all the operators should be treated in the same way by regulation. Corresponding evidence in Spain indicates that collaborative and professional types of accommodation have diverse locational patterns and market behaviours (Herrero Ballesta, 2024). Such results are relevant to tourism policy since neighbourhood-based visitor pressure is not only related to the number of listings, but also to the strength and organisational structure of supply of accommodation.

A third body of literature emphasizes the more general urban impacts of short-term rental growth. Recent research discovers that listing heterogeneity affects rent dynamics, housing prices, and gentrification pressures, and communities that rely on tourism can face various types of residential displacement associated with visitor-oriented housing conversion (Lee and Kim, 2023; Stojčić et al., 2024). These changes are related to the politics of urban tourism in other work, which demonstrates that the short-term rental governance is integrated into the broader conflicts about the social legitimacy of visitor development and neighbourhood transformation (Milano et al., 2024). Spatial concentration in this literature is not only a market characteristic; it is a policy issue that is related to the liveability, destination carrying capacity and unequal exposure to tourism.

A fourth contribution comes from recent studies of platform regulation in New York City and other dense urban markets. Voltes-Dorta (2025) show that post-regulation price competition in New York is shaped by multi-listing hosts, while Gyódi (2024) document the geographical unevenness of Airbnb activity and professional host presence across European cities. Combining these studies, one can suppose that tourism accommodation governance needs beyond citywide aggregate restrictions. It needs techniques that can help locate where the supply to visitors is concentrated and how the supply is organized and which submarkets are likely to generate disproportionate policy pressure.

In spite of these advances, the empirical foundation of the majority of the current studies is platform-based. Administrative short-term rental registries are increasingly becoming a feature in key tourist spots, but little research has been done on how the data of registries can be translated into an effective tourism policy instrument. This gap is the focus of this paper because it uses an administrative registry to make neighbourhood-based policy signals and because it compares other rules that prioritize destinations to destination-management purposes.

3 CASE SETTING, DATA, AND ANALYTICAL FRAMEWORK

3.1. Case Setting and Data Source

The empirical setting is New York City, a large urban destination in which short-term rentals have become central to debates over tourism accommodation, neighbourhood change, and regulatory design. The analysis uses the short-term rental registration-and-listing dataset published by the New York City Office of Special Enforcement and described in the city's FY25 registration reporting materials (New York City Office of Special Enforcement, 2025). The file reports registration number, status, expiration date, address fields, borough, ZIP code, building identification number, booking service, and listing identifier. Because a single registration can appear in multiple rows when it is linked to more than one platform listing, the raw spreadsheet was transformed into two connected analytical levels: the registration and the ZIP code.

The working sample retains registrations whose status is recorded as *Registered* at the publication date. After deduplicating repeated records by registration number, the active registry contains 3,194 registrations. These registrations are linked to 3,073 listing identifiers. The mismatch between active registrations and attached listings indicates that legal participation in the registry should not be interpreted as a direct measure of currently visible market supply.

3.2. Conceptual Framing

The analytical framework treats the registry as a representation of legal tourism accommodation capacity rather than as a simple compliance ledger. Four dimensions are central. The first is scale, which captures the size of the local registered accommodation market. The second is listing intensity, which reflects how many advertised listings are attached to the registered stock and therefore proxies the local intensity of market-facing visitor accommodation. The third is platform dependence, which reflects how concentrated the visible supply is within a narrow platform ecosystem. The fourth is renewal vulnerability, which captures the short-term administrative fragility of the registered stock by identifying registrations due to expire within 180 days.

Together, these dimensions are interpreted as components of neighbourhood-level tourism accommodation pressure. A locality with a large registered stock, high listing intensity, strong plat form dependence, and elevated near-term renewal pressure presents a different policy problem from one that is simply large. The first may require more active destination management because accommodation visibility and administrative fragility coincide in the same local market.

3.3. Variable Construction

Let r denote a registration and z a ZIP code. For each registration, the number of attached listings is denoted by L_r. A binary indicator of observable market activation is defined as

$$A_r = \begin{cases} 1 & if\ L_r > 0 \\ 0 & if\ L_r = 0 \end{cases} \tag{1}$$

This distinction separates legal entry into the registry from visible participation in the advertised market.

At the ZIP-code level, the following indicators are constructed:

$$R_z = \sum_{r \in z} 1 \tag{2}$$

$$L_z = \sum_{r \in z} L_r \tag{3}$$

$$M_z = \frac{1}{R_z} \sum_{r \in z} \mathrm{II}(L_r > 1) \tag{4}$$

$$N_z = \frac{1}{R_z} \sum_{r \in z} \mathrm{II}(A_r > 1) \tag{5}$$

$$E_z = \frac{1}{R_z} \sum_{r \in z} II(\text{expiry within 180 days}) \tag{6}$$

Where R_z is the number of active registrations, L_z is the number of attached listings, M_z is the share of registrations with multiple attached listings, N_z is the share of active registrations without an attached listing, and E_z is the share due to expire within 180 days.

Platform concentration is measured by a Herfindahl–Hirschman style index over booking services observed in each ZIP code:

$$\mathrm{H}_z = \sum_{p=1}^{P_z} s_{pz}^2 \tag{7}$$

Where s_{pz} is the share of listing rows in ZIP code z associated with platform p. Values closer to one indicate stronger dependence on a single distribution channel.

To describe the spatial concentration of visible accommodation supply across ZIP codes, the Gini coefficient is calculated over the distribution of L_z:

$$\mathrm{G} = \frac{\sum_{i=1}^{n} \sum_{j=1}^{n} \left| L_i - L_j \right|}{2n \sum_{i=1}^{n} L_i} \tag{8}$$

This provides a citywide measure of how unevenly visible short-term rental activity is distributed across neighbourhoods.

3.4. Tourism Accommodation Pressure Score

The composite policy indicator is built at the ZIP-code level. Four normalised components are used:

1. Registered accommodation scale, based on R_z
2. Listing intensity, based on the multiplicity share M_z
3. Platform dependence, based on H_z;
4. Renewal vulnerability, based on E_z.

Each component is transformed using min–max normalisation,

$$x_z^* = \frac{x_z - \min(x)}{\max(x) - \min(x)} \tag{9}$$

And the tourism accommodation pressure score is then defined as

$$TAP_z = \frac{1}{4}(R_z^* + M_z^* + H_z^* + E_z^*) \tag{10}$$

Equal weighting is used intentionally to preserve interpretability and to avoid implying stronger prior knowledge about relative policy importance than the cross-sectional data can support. ZIP codes are subsequently grouped into quartile-based pressure tiers labelled low, moderate, high, and critical. A four-cluster k-means segmentation is also estimated for descriptive visualisation of neighbourhood portfolio profiles, although the quartile-based pressure tiers remain the main classification used in the paper.

3.5. Area-prioritisation Simulation

The final step evaluates how alternative neighbourhood-prioritisation rules perform under fixed policy capacity. For a given budget b, measured as the number of ZIP codes that can be targeted, three strategies are compared:

1. Pressure-based prioritisation: Select the b ZIP codes with the highest TAP_z.
2. Volume-based prioritisation: Select the b ZIP codes with the largest number of active registrations R_z.
3. Random selection: Select b ZIP codes uniformly at random, averaged over repeated draws.

For each rule, policy coverage is measured as

$$C_y(b) = \frac{\sum_{z \in Z_b} y_z}{\sum_z y_z} \tag{11}$$

where y_z denotes the policy target and Z_b is the set of selected ZIP codes. Two targets are empha sised. The first is total attached listings, which captures coverage of visible visitor accommodation supply. The second is registrations expiring within 180 days, which captures short-term portfolio fragility and the need for timely policy attention.

4. EMPIRICAL RESULTS

4.1. Structure of the Registered Accommodation Market

The active registry contains 3,194 registrations, yet only 3,073 listing identifiers are attached to these records. Thus, 22.6% of active registrations were not linked to a visible listing at the publication date. This distinction is substantively important. A registry describes legal accommodation capacity, but not all legally registered units are simultaneously market-facing.

The borough pattern is uneven. Brooklyn accounts for 1,585 active registrations and 1,534 attached listings, while Queens contains 921 registrations and 909 listings. Manhattan is smaller in registration count, with 385 active registrations, but shows the highest near-term renewal vulner ability, with 9.6% of active registrations expiring within 180 days (Figure 1). The Bronx and Staten Island remain comparatively small and also exhibit larger shares of active registrations without an attached listing. Table 1 reports the borough-level structure.

Spatial concentration is also visible below the borough level. The Gini coefficient of attached listings across ZIP codes is 0.560, and the ten largest ZIP-code markets account for 30.0% of all attached listings. Listing multiplicity is limited for most registrations but remains policy-relevant: 13.3% of active registrations have more than one attached listing, and the maximum observed multiplicity is 12. Figure 2 presents these distributional features.

Platform dependence is especially pronounced. Among listing rows with a disclosed book ing service, Airbnb accounts for 95.2% of attached advertised listings. Booking.com and Expe dia/VRBO/Hotels.com/Travelocity represent much smaller shares. This suggests that visible reg istered accommodation remains strongly tied to a single platform ecosystem, which may matter for policy resilience and the transparency of market monitoring.

4.2. Neighbourhood Segmentation by Tourism Accommodation Pressure

The ZIP-level tourism accommodation pressure score highlights local markets that combine accom modation scale with administrative and platform fragility. The highest-scoring ZIP code is 11221, which is large in absolute terms and also exhibits non-trivial renewal vulnerability together with strong platform concentration. High-pressure scores are not confined to the largest markets, how ever. Several smaller ZIP codes rank highly because they combine moderate scale with unusually high shares of near-term expirations. Examples include 10019, 11249, 10035, and 11432.

Table 2 reports the ten highest-scoring ZIP codes among neighbourhoods with at least ten active registrations. A common feature of the critical tier is not simply market size, but the coexistence of scale with portfolio fragility: the average share of registrations expiring within 180 days is materially higher in the critical tier than in the low or moderate tiers.

Figure 3 provides a broader view of the segmentation results. The scatterplot in Panel (a) shows that highly ranked neighbourhoods do not merely mirror the largest markets; several become prominent because renewal vulnerability is high relative to their size. Panel (d) also shows that high-pressure ZIP codes are distributed across more than one borough, supporting a portfolio-based rather than purely volume-based approach to tourism accommodation policy.

Table 1: Borough-level structure of the active registered accommodation market

Borough	Active registrations	Advertised listings	Listings/registration	Multi-listing (%)	No listing attached
Brooklyn	1585	1534	0.97	12.2	19.4
Queens	921	909	0.99	15.6	26.0
Manhattan	385	385	1.00	13.0	17.1
Bronx	194	158	0.81	14.4	37.1
Staten island	109	87	0.80	10.1	33.9

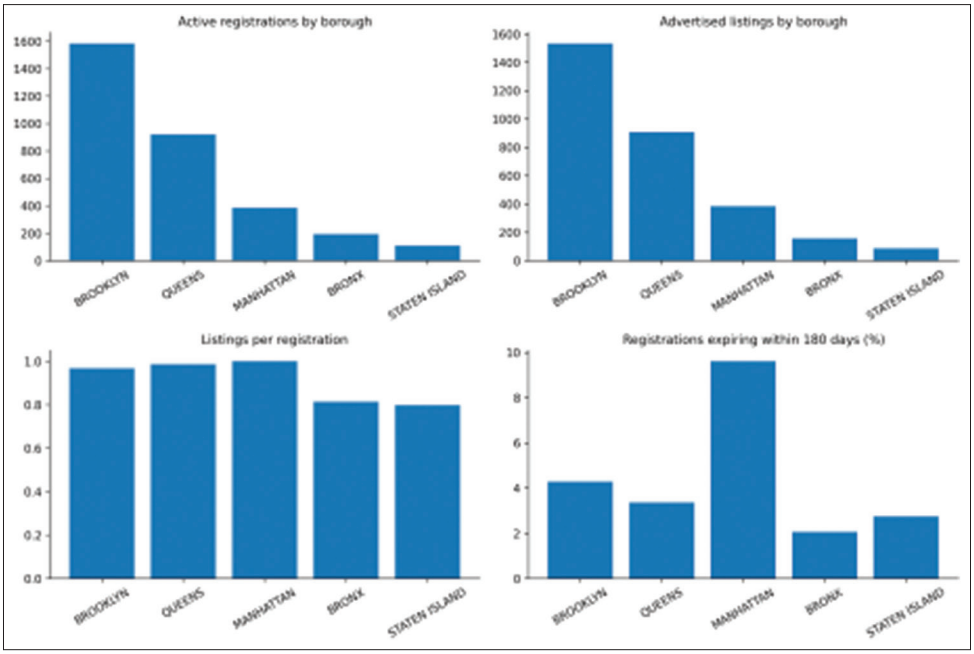
Percentages are calculated on the basis of active registrations. "No listing attached" indicates that an active registration did not have a listing identifier in the published dataset

Table 2: Top ZIP codes by tourism accommodation pressure score

ZIP code	Active registrations	Advertised listings	Listings/registration	Expiring within 180 days (%)	Risk score
11221	159	163	1.030000	5.700000	0.659000
10019	15	15	1.000000	26.700000	0.625000
11233	136	139	1.020000	4.400000	0.569000
10035	22	23	1.050000	18.200000	0.567000
11249	30	27	0.900000	20.000000	0.567000
11432	14	13	0.930000	21.400000	0.559000
10016	10	9	0.900000	20.000000	0.533000
11206	47	47	1.000000	10.600000	0.528000
11216	108	101	0.940000	3.700000	0.527000
11368	13	21	1.620000	7.700000	0.513000

The tourism accommodation pressure score is the equally weighted mean of the normalised ZIP-level indicators for registered accommodation scale, listing multiplicity, platform concentration, and near-term renewal vulnerability

Figure 1: Borough dashboard of the active registered accommodation market



4.3. Policy Simulation Results

The area-prioritisation exercise reveals a clear trade-off across policy objectives. When the aim is to cover as much visible visitor accommodation as possible, volume-based prioritisation performs best. With a budget of 20 ZIP codes, volume targeting covers 45.6% of all attached listings, compared with 27.1% for pressure-based prioritisation and 18.6% under random selection. This result is expected because the volume rule follows the largest accommodation markets directly.

The ranking changes when the objective shifts to neighbourhoods with short-term portfolio fragility. At the same budget of 20 ZIP codes, pressure-based prioritisation captures 49.7% of all registrations expiring within 180 days, outperforming volume-only targeting (43.4%) and random selection (18.6%). The advantage persists as the budget rises. With a budget of 30 ZIP codes, the pressure-based rule covers 66.4% of near-term expirations, compared with 55.2% for volume targeting and 28.3% for random selection.

These results imply that neighbourhood prioritisation should be matched to the policy objective. A volume rule is useful when the goal is broad visibility over the active accommodation market. A pressure-based rule is more effective when the aim is to identify neighbourhoods where tourism accommodation is both visible and administratively fragile. Figure 4 summarises the simulation outcomes.

Figure 2: Distributional features of the active registered accommodation market

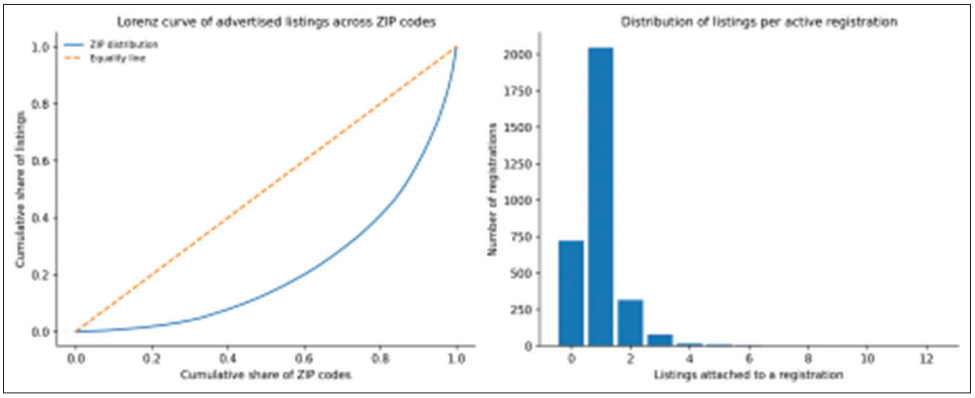


Figure 3: ZIP-level tourism accommodation pressure segmentation and platform structure

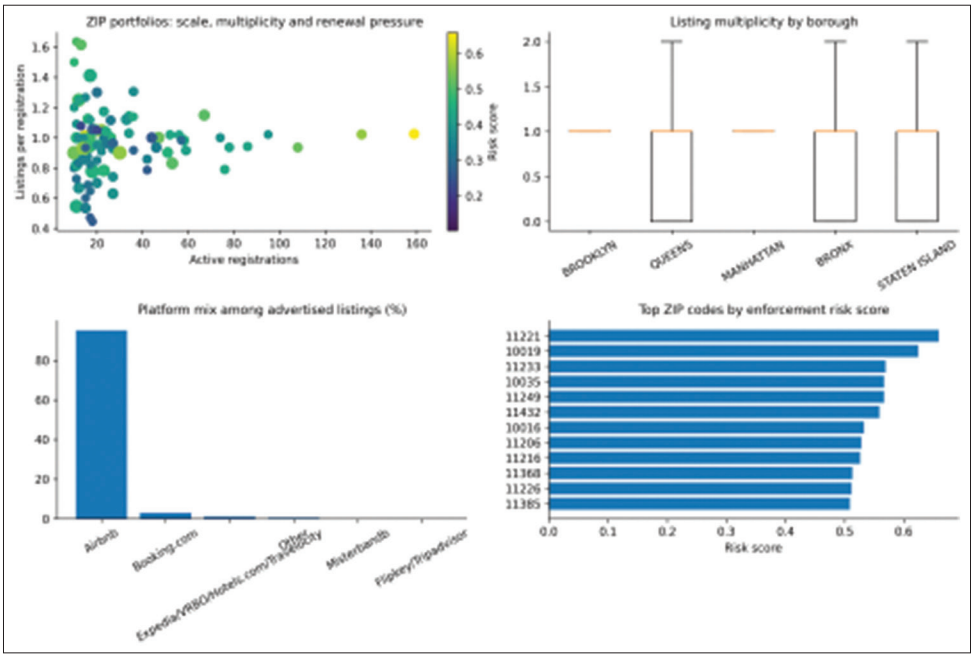
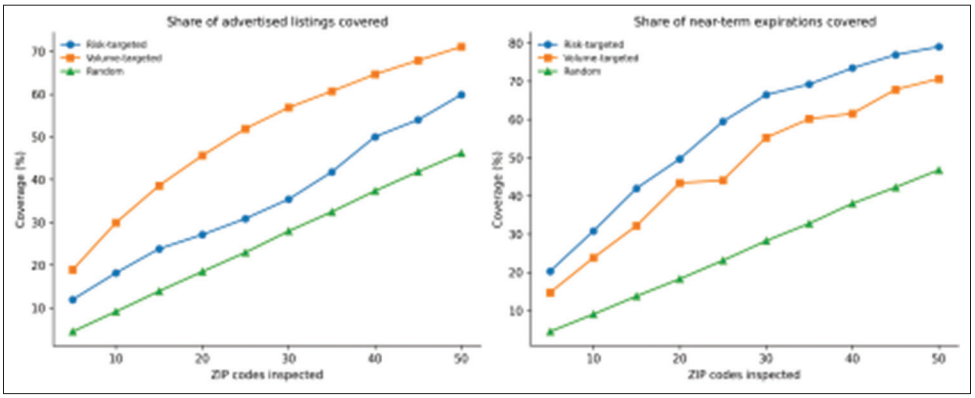


Figure 4: Performance of alternative neighbourhood-prioritisation rules



5. DISCUSSION

The findings help to justify three general tourism policy arguments. To begin with, legal registration and market activation cannot be considered the same concepts. That 22.6% of the active registrations have no listing record attached suggests that the number of the registries can overstate the existing visible supply of accommodation to the visitors. This implies that destination managers should not use legal capacity to measure the pressure of active tourism.

Second, the legal short term market is highly concentrated even in the formal state of mandatory registration. Focality is

evident within boroughs, ZIP codes and with booking services. This is consistent with the larger body of literature indicating that platformised accommodation market are usually spatially disproportionate and operationally characterized by the narrow channel forms (Gyódi, 2024; Herrero Ballesta, 2024; Voltes-Dorta, 2025). The policy implication, in tourism policy terms, is that governance of accommodation at the neighbourhood level can be selective but not arbitrary: a comparatively small set of neighbourhoods contributes a disproportionate share of registered supply which is visible.

Third, destination managers are advised to differentiate between two policy tasks which are usually confused. One of the tasks is to track the location of the biggest visitor accommodation markets. The other is to find neighbourhoods where accommodation scale is shared with fragility, especially when there is high renewal vulnerability and platform dependence. The simulation indicates that the optimal rule varies with the prioritisation of one of these goals. A hybrid design will thus tend to be more justifiable than a single allocation logic: One element of policy capacity can adhere to market size, another to neighbourhoods with high accommodation pressure.

They are also findings that address a broader discussion on sustainable urban tourism. The short-term rental policy is commonly viewed as a housing protection or a market regulation. The fact here implies yet another framing: It is also a destination management. Where the short term rental accommodation is concentrated, the presence of visitors is also more likely to cause unevenness in neighbourhoods. Such concentration can be identified and addressed by policies that can help a more equal distribution of tourism accommodation and minimise the danger of pressure being concentrated noiselessly in a few neighbourhoods.

The study has limitations. The registry characterizes the legal market as opposed to the entire universe of short-term rental activity, and thus unregistered supply cannot be directly monitored. The published file is cross-sectional also, which limits inference of entry, exit and renewal behaviour with time. Lastly, the pressure score is also purposely parsimonious. It is valuable as policy clarity and transferability and not exhaustive causal modelling. Nonetheless, the framework illustrates the manner in which the records of administrative accommodation can be structured into a sensible instrument of tourism policy.

6. CONCLUSION

The paper constructs a factual model of tourism accommodation policy and illustrates how this model can be applied using a case study of New York City. It demonstrates that the legal accommodation market is unevenly dispersed, highly platform-dependent, and that it is relatively characterised by significant neighbourhood differences in vulnerability to renewal. It further demonstrates that varying area-prioritisation regulations lead to varying policy payoffs: volume-based selection enhances a wide coverage of visible supply, whereas pressure-based prioritisation is more efficient when the goal is to find neighbourhoods with short-term portfolio vulnerability. What this means is that destination-management infrastructures do not have to be transparency devices but can be short-term rental registries. Administrative records can then be used to facilitate a more selective and place-sensitive tourism accommodation policy by distinguishing legal entry and market activation as well as by translating local market structure into interpretable neighbourhood scores. Future work may be able to further build upon this by adding registry data with visitor flows, complaints, l and-use controls, or repeated registry snapshots to simulate the time-varying accommodation pressure in neighbourhoods.

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