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Transnational displacement by short-term rentals in Japan's depopulating society: Dilemma between rent gap emergence and inbound tourist accommodations

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Abstract

The influence of the so-called "Airbnb effect" on local housing markets has grown into a global concern for affordability crisis, gentrification, and displacement. We analyzed the impacts of short-term rental (STR) on the rental housing market and explored the relative factors for the rent gaps in Tokyo and Osaka: two major metropolitan areas in Japan. This research builds upon the rent gap theory by Neil Smith and clarifies the rent gaps by following previous work. Our results demonstrate that landlords in Osaka, more depopulated with unoccupied housings, have already removed a significant number of residential rental units from the housing market, and those of Tokyo, less depopulated with less unoccupied housings, is likely to evict their tenants to shift more profitable touristic short-term rentals when their long-term rentals' rent revenue decreases. We concluded that the rent gaps affected by the depopulated societal context require tougher limits on touristic short-term rentals to mitigate "transnational displacement." The future of community livability depends upon municipalities' ordinance as well as their strategies: how to leverage unoccupied housing to survive an era of shrinking economy.

Keywords
depopulating society, displacement, Private Lodging Business Act, rent gap, short-term rentals

1. Introduction

1.1 Depopulating society and short-term rentals (STR)

Japan is one of the most rapidly aging and depopulating countries. As the working age population declines and domestic demand shrinks, the national government puts high expectations toward inbound tourism to boost the domestic economy. Increasing of foreign tourists results in higher room occupancy rates of hotels, especially in metropolitan areas such as Tokyo and Osaka. In the face of this circumstance, the emergence of the home-sharing platform, Airbnb, helps landlords to transform unoccupied housing units into cash-generating assets for the inbound tourism accommodations. The national government enacted the Private Lodging Business Act of 2018, and municipalities' local ordinance followed the national legislation. This leads to consequent deactivation of numerous legal listings.

Previous studies have documented the negative impacts of Airbnb including affordability crisis, displacement, and gentrification.[1–5] Here, we build on this tradition to explore the impacts of short-term rental (STR) on the traditional rental market in Japan, and the relative factors for the rent gap in Tokyo and Osaka. How do STRs affect housing and communities? How regulations influence STRs activities? To what extent is STRs impact on housing and communities similar or different elsewhere?

To answer these questions, we investigated rent gap emergence in Tokyo and Osaka, where have large numbers of Airbnb listings, and the higher share of renter households which may give considerable impact on rental housing market:

more Airbnb listings lead to higher rent and displacement. The first section of the paper explains the context of the national and local regulations on touristic STR. Japanese characteristics of Airbnb regulation were explained by its purpose of legislation and identified by comparison with other global cities' regulation.[6–9] The second section shows the increase in Airbnb listings and calculates open and closed rent gaps in Tokyo and Osaka. The third section explores the correlationship between the rent gaps and the depopulation indicators: population decline, rent shift, and residential unoccupancy rate.

Figure 1 shows the analytical framework adopted for this study. The main objects of analysis are rent gaps and its relative factors. Inbound tourism for economic revitalization and displacement by rent gap formation constitute the two constructs of our theoretical framework applied to the empirical cases. We interpret the increase in Airbnb listings and rent gap based on these constructs: positive and negative sides of STRs for Japan's depopulating society. This article is the first attempt to offer a structural explanation on the Japanese STRs in the dilemma between inbound tourism and displacement. Japan ranked the highest increase in active Airbnb in 63 countries during 2018 to 2019.[10] Rent gaps are explored by following Wachsmuth's method[4] which measured new revenue flows into the STR market.

1.2 Displacement by rent gap formation

This paper understands rent gap emergence as a trigger to induce displacement and affordability crisis: unoccupied long-term rental housing transfer to touristic short-term rentals may lead to local tenants' displacement. We follow theories of gentrification, displacement, and rent gap by Marcuse[11] and Smith.[12] Marcuse[11] introduced "direct displacement" commonly associated with gentrification-induced displacement: landlords evicting tenants to raise rents of redevelop. Smith[12] provided the rent gap model and offered a structural explanation for gentrification and urban displacement. "The rent gap model describes a situation where the actual economic returns to properties tend to decline or stagnate while potential economic returns tend to increase. In neighborhoods where this gap between actual and potential returns systematically increases, the result will be a correspondingly increasing incentive for real estate capital to direct new housing investment flows (Wachsmuth[4]: 1151)."

Negative effects of STRs are well studied with the rise of home-sharing platforms including displacement,[3] gentrification,[1,4] affordability crisis.[2,5,9]. Cocola-Grant,[1] for instance, portrayed Airbnb as an example of "buy-to-let gentrification that is experienced by residents as a process of social injustice. Airbnb gives way to hyper-flexible rental market that for tenants implies increasing insecurity and displacement concerns."

We applied Wachsmuth's method to calculate Airbnb's rent gaps. Yrigoy[5] suggests that "Rent gap theory can be helpful for understanding how tourist rentals affect residential rental housing. It is argued that on those properties currently rented to residents, rental payments are not only "actual ground rent," but also "potential ground rent." The shift from a residential to a touristic use of rental housing thereby creates a potential ground rent."[5] Airbnb creates a new rent gap—difference between the revenue from long-term and short-term rents—which encourage conversions.[13]

1.3 Inbound tourism accommodation for economic development

According to the global tourism data from United Nations World Tourism Organization in 2018, the number of international tourist arrival in Japan ranked 11th, 31.19 million, and the tourism revenue ranked 9th, 42.1 billion USD[14] in global market. In 2019, total number of Japanese overseas travelers and tourism consumption by international visitors hit a record: exceeding 20 million for the first time since 1990 and 4.8135 trillion yen.[14] The national government considers inbound tourism to be one of its key growth industries in the light of Japan's declining population and aging. The rapid decline in the population, coupled with its graying, is bound to bring about various changes such as lower labor productivity, depressed regional economies, and a reduction in real estate demand. 13.6% of entire housing stocks are unoccupied across the country in 2018.[15]

Previous studies documented the beneficial economic effect on local revitalizations by tourism accommodations.[16–18] For instance, Dogru[17] showed that Airbnb supply positively affects employment in all sectors of the hospitality, tourism, and leisure industries. Balampanidis[16] found the positive effects as partial upgrading and reuse of the existing building stock or the reactivation of the local economy. However, there has been a significant backlash against tourists giving rise to the term "overtourism" [19] in concert with the emergence of Airbnb.

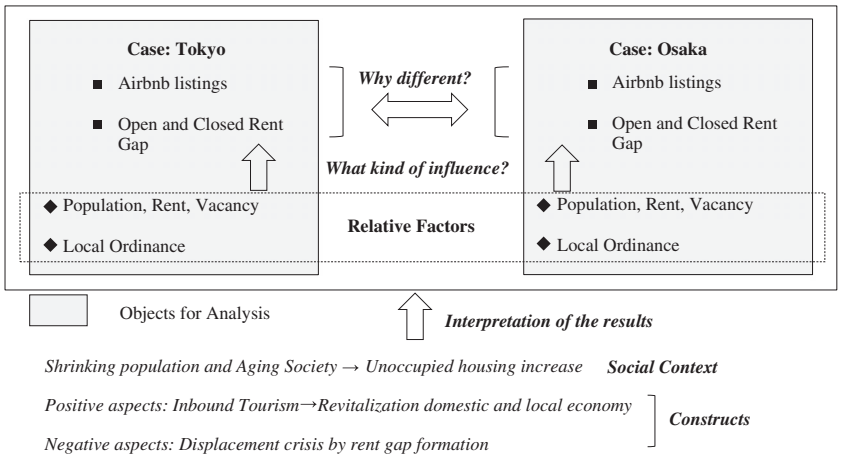

FIGURE 1. Case study design and analytical framework

Overtourism induces occasional nuisance to neighbors,[20,21] and the loss of their character.[13]

2. Methods

The empirical research followed five-step analysis.

2.1 Selecting the case and targeted cities

Private lodgings in Japan have been around so long before the emergence of home-sharing digital platform, often called as guest house, which feature experiencing rural life, farming, and local culture while staying Japanese traditional houses. These are not the case of this article. Our targets are private lodging as an alternate means of hotels in urban cities. Because of the following reasons, we selected Tokyo and Osaka as the case study cities to reveal the rent gaps. First, these are the major metropolitan areas with many private lodging listings, total of two cities share 46.5% in Japan.[14] These are registered STRs under the Private Lodging Business Act of 2018. Second, both cities have the higher share of renter households compared with the national average of 35.6%: 49.1% in Tokyo and 54.5% in Osaka.[15] Third is the severe competition in hotels industry. Hotel occupancy rate ranks the two highest cities in the country: 80.3% in Tokyo and 79.8% in Osaka compared to national average 61.1% due to increasing inbound tourists.[22]

2.2 Analysis of Airbnb regulation

We revealed the concept, purposes, social context, and rules of the national government legislation and the municipalities' ordinance extracted from government documents and articles of legal papers. Rules are divided into four restrictions: caps on operating days, area zoning, qualified buildings, management by lodging business operators. Cross-national comparison enabled us to highlight the characteristics of Japanese regulations on STRs. Global cities with numerous Airbnb listings, London, Paris, New York, are targets for comparison.

2.3 Analysis of rent gaps

Table 1 shows indicators, method of calculation, and data sources used in the article to show Airbnb activities and rent gap. We used two major data of Airbnb activities in Japan. One is the AirDNA which is often used in many articles, and the other is registered data of private lodging agency managed by the Japan Tourism Agency. What we emphasize here is that the analysis target of Airbnb activities is a period from July 2017 to December 2019 excluding COVID-19 effects. This period allowed us to examine the effects of the national legislation enacted in June 2018. The Housing and Land Survey in Japan has tabulated the number of unoccupied housings "for rent," "for sale," "no purpose," and "secondary" by each building type. We, however, used total number of unoccupied housing" for vacancy rate which would be more appropriate because all unoccupied housing for any reasons are potentially exposed to the shift from a residential to a touristic use.

Wachsmuth[4] measure new capital flows into the short-term rental market by two indicators: closed rent gap and open rent gap. Closed rent gaps refer to "high current impact" and open rent gaps mean "high risk of future impact by STRs. Closed rent gap is STR's share of total annual residential rents, including long-term and short-term. Open rent gap is it share of annual long-term rents. We calculated closed and open rent gap by following Wachsmuth's method showed in the methodological appendix. What is different from their method is that we used average rent in denominator of open rent gap in contrast with median gross rent (Wachsmuth[4]). We calculated the rent gaps by ward-scale to show the difference and examine its reasons. The current structure of the special districts of Tokyo consisted of 23, in which each ward has the authorities and financial resources. This is different from 24 wards in Osaka which only functions as branches of Osaka city. Local ordinance is developed each ward in Tokyo, and Osaka has single ordinance established by city level.

2.4 Relative factors of rent gap

We analyzed the correlation between rent gaps and depopulated indicators: population decline, unoccupied housing rate, rent shift in the assumption that these context impacts the emergence of rent gap. We calculated Pearson's product moment correlation coefficient by SPSS 22 Long-term housing's rent shift was identified by real-estate company's open data (Table 1).

2.5 Analysis and synthesis

Finally, we discuss the impacts of short-term rental in terms of tensions and gaps between displacement and inbound tourism. We examine why Airbnb activities, and its effects are different between Tokyo and Osaka. We synthesized previous research findings and our structural explanation on the Japanese short-term rentals which leads to conclusion.

3. Results

3.1 Result 1: Japanese STRs regulation

3.1.1 Private Lodging Business Act of 2018

The Private Lodging Business Act came into effect in June 2018. Its Section 1 states its purpose as "contributing to improve the stability of people's lives" and "developing the national economy". There are two measures installed to ensure stability of people's lives. One is setting 180 days caps for running tourist rental business to mitigate STRs impacts on neighbors, and the other is requiring to hire manager with absence of landlords' residency to preserve the living environment of the surrounding area where STRs locate. Managers are responsible for preventing neighborhood dispute and responding their complaint. The act is an endorsement of STR business by the national government to accommodate inbound tourists in response to a shortage of hotels. National strategic special zones without caps are also designated to "deregulate" STRs in the limited area outside the primary residential zone. These special authorized STRs are excluded from our analysis.

Another idea for the legislation is to promote effective use of increasing unoccupied housing in depopulated society. Actively utilization of unoccupied private properties as local resource are considered to be effective to revitalize the residential areas.[23] Qualified housing under the act shall be currently used as the primary residence, vacation rentals, long-term rental housing which is advertised to tenants. Thus, renting out of these housings as tourist STRs must be a secondary function less than 180 days. The Hotel Business Act states hotels as "not a home for primary residency."

The Hotels and Inns Act was amended in 2016 and 2017 prior to the Private Lodging Business Act legislation. Primary amendment includes deregulation of the size of room in lodging houses and strengthens restrictions on lodging business operator who violates the law. Airbnb listings include STRs

TABLE 1. Indicators, methods, and data sources used in the article

	Indicator	Method	Data source
Airbnb activities	Airbnb listings	Direct extraction from AirDNA	AirDNA: number of Airbnb listings (July 2017–December 2019)
	Airbnb average rate per night (Yen)	Direct extraction from AirDNA (durararion: July 2017–June 2018, July 2018–June 2019, July 2019–December 2019)	AirDNA: average daily rate
	Long-termAvgMontly Rent (Yen)	Long-term rentals' monthly average rent	Housing and Land Survey by Statistics Bureau of Japan[15]
	AirbnbMontlyRevenue (Yen)	STR historical monthly market revenue	AirDNA: number of Airbnb listings, historical market revenue during July 2017 to June 2020
	AirbnbAvgDailyRent (Yen)	Airbnb average daily rate	AirDNA: average daily rate, median of operation
Rent Gaps	Closed Rent Gap	*Sum of **AirbnbMontlyRevenue** of all listings during the period/(Sum of **AirbnbMontlyRevenue** of all listings during the period+ **Long-termAvgMontlyRent***number of LTR unists*period)*	Same as ***AirbnbMontlyRevenue*** and ***Long-termAvgMontlyRent***
	Open Rent Gap	*Sum of **AirbnbAvgDailyRent***30 days*Median of operation during the period/ **Long-termAvgMontlyRent***periods*	Same as ***AirbnbAvgDailyRent*** and *Long-termAvgMontlyRent*
Population and Housing Census: Relative factors for rent gaps	Change of Population (2015–2010/2010)	Population of 2015/Population of 2010	Population Census by Statistics Bureau of Japan (2010, 2015)
	Unoccupied Housing (2018)	Direct extraction from Housing and Land Survey fo private rental properties	Housing and Land Survey by Statistics Bureau of Japan[15]
	Change of Housing Price (2019–2017)/2017	Change of housing rent during January 2017–October 2019 (estimated by Artificial Intelligence based on transaction for over 10 years building, 70 square meter room)	LIFULL Co., Ltd.: Japan's top provider of real estate and housing information web service

Italic bold text in the Indicator column is equal to the indicators (italic) in the other columns.

under the Private Lodging Act and lodging houses authorized by the Hotels and Inns Act. The major difference between these two is the building use: former is residential building and the latter is hotel or inn both of which are controlled by local zoning. The number of lodging houses has rapidly increased since the deregulation of the Hotels and Inns Act.[24]

3.1.2 Local Ordinance for STRs before and after legislation

Local governments responded fast in light of residents' growing concerns for Airbnb style home rentals. They adopted their own rules to curb STRs to preserve local living environments. There are several municipalities who established local ordinance before the national legislation. This is due to "shadowy private lodging service" which has been already active in response to growing inbound tourism demands. Local ordinances have their intention to mitigate the negative externalities: nuisance to neighbors such as noise, dispose of garbage, and an unfounded prejudice against foreigners worsening public security.

Commonly rules established by local governments are lowering caps of 180 days and restricting STRs in the primary residential zone. There are local ordinances that forbid private lodging operations on most weekdays and near elemental school within 100 meters. Hotels are prohibited to locate in the primary residential zone which shares approximately 40% of zoning area across the country.[25]

However, local regulations are limited by the national government ceiling. The Act of Section 18 states that local governments can establish their own regulation "to the extent reasonably necessary" to mitigate noise and prevent deteriorating local living environment. The national government guidance argues that municipalities have to give full consideration whether their regulation is excessive enforcement or conflicting ruling through the purpose of the national legislation.[26]

3.1.3 Japan's characteristics of regulation by cross national comparison of STR regulation

Table 2 shows the different rationale and rules in global cities with numerous Airbnb listings. Rationale and its rules are identified by each country's government document. These do not include building codes, fire codes, and land use zoning applied for general buildings. STR regulation is categorized into four restrictions: caps on operating days, area zoning, qualified buildings, and management.

Nieuwland[9] identified a typology of STR regulations. The first type of cities is mainly trying to ease the pressure of tourism, by implementing a full or partial ban of Airbnb. The second type does not allow entire houses to be listed on the platform and has restricted the numbers of nights a property can be rented out. These cities, including London and New York, are mostly concerned with protecting affordable housing. New York has more subsidized housing, more rent regulation, greater local spending on housing and a more heavily regulating housing market than most other cities.[13] The final type concerns the most lenient cities, Paris, who mainly want to preserve residential living by restricting the amount of rented nights on STR or by requiring primary residence.

TABLE 2. STR regulations of cities with the most Airbnb listing and Japan

	London (N, C)	Paris (N, C)	New York (C)	Tokyo and Osaka (C)	Japan (N)
Legislations and Acts	Deregulation Act 2015 (N) Greater London Council Act 1973(L)	Bill ALUR (N)	Multiple Dwelling Law (L) Rent Stabilization Law (L) Administrative Code (L)	Local Ordinance (L)	Private Lodging Act 2018 (N)
Nuisance	✓	✓	✓	✓	✓
Affordability	✓		✓		
Economy		✓			✓
Right of landlords	✓				
CAP on operating days	90 days	4 months	×	180 days (N) 180 days and more (L)	
Area zoning	×	No residential area	×	No residential area (L)	
Qualified building for STRs	No permission required for less than 90 days	Furnished STRs for tourist must report to government, registration as business required for owner staying less than 8 months	Not allowed: rent controlled, stabilization apartments, apartments with more than 3 units, landlords staying less than 30 days One Host, One Home	Allowed only unoccupied housing due to owner absence or no tenants Not allowed: new development	
Management	×	×	×	Owner staying: management by their own Owner absence: require subcontracting management	

Abbreviations: L, Local government; N, National government.

Regulations are determined by local context and purpose for restricting STRs. The purpose of legislation is a measure to promote tourist rental service and give legal status for STRs which nuisance to neighborhood. Altura[27] suggests that "Airbnb garnered support from powerful governmental and industry actors (in Japan) who framed the sharing economy as a solution to various economic and social problems".[27]

At the same time, it intends to solve the dilemma between sustainable economy and social stability. Japanese restriction by caps and area and rules for management comes from their purpose to preserve neighborhood living environment and mitigate negative externalities. Ferreri[6] argues that local governments are struggling to balance corporate interests with public good. Los Angeles's reluctance to regulation, for instance, is in part driven by the need for the tax revenue.[13] Japanese regulations do not have perspective to preserve affordable housing (Table 2). New York and London belong to Nieuwland's second type which narrows the range of qualified housing stock to be converted to STRs. Unique rule in Japan for limiting qualification is that landlords are required to advertise their properties for rent. However, this may be not strict regulation in the sense that occupancy depends on tenants' decision not fully controlled by tourist rental business agents. As Nieuwland suggests, most cities do not fit perfectly in one category, but we would position Japanese regulation as the case with the final type. Japanese regulation is contrary to the first type and does not have perspective of the second type.

3.2 Result 2: Airbnb activities and rent gaps

3.2.1 Airbnb activities

Figure 2 shows the changes in the number of Airbnb listings in Tokyo and Osaka during July 2017 to December 2019.[28] Number of listings exceeds 10 000 both cities a year before the legislation. Following the legislation, however, Airbnb listing in both cities began to decrease. This is approximately 20% decline from a year before the legislation. Since early 2019, Airbnb activities apparently have started to recover. These trend are consistent with the registration number of STRs to Japan Tourism Agency.[29] The balance between the cities remained steady approximately at 3000 until the legislation, but the number of Tokyo surpass Osaka during the recovery period.

Figure 3 indicates the Airbnb daily rate change in Tokyo and Osaka with its balances.[28] The annual gap between Tokyo and Osaka is expanding: 1574 yen in July 2017, 1671 yen in July 2018, and 4654 yen in July 2019. The annual difference of Tokyo continued to increase, but that of Osaka decreased following the legislation.

Figure 4 shows the Airbnb monthly revenue in Tokyo and Osaka during July 2017 to December 2019[28] which has the same tendency with Figure 3. Airbnb listings have been increasing since early 2019, but we can see in this figure that the monthly revenue has shrunken since April 2019. This is due to decrease in daily rate in the same period (Figure 3).

Figure 5 shows the hot spot of active Airbnb listing and number of tourism attraction by wards in Tokyo and Osaka. Top 30 popular tourism attractions are identified by TripAdvisor data (2019). In Tokyo, there is more attraction located in the ward with more Airbnb listing, however, this is not the case with Toshima-Ward. In Osaka, many attractions are concentrated in Chuo-Ward where has a large number of listings. But this does not apply to the Nishinari-Ward: having more listing but few attractions. Chuo, Naniwa, and Nishinari-Ward have convenient access to the Kansai Airport which is the gateway for foreign tourists. By contrast, accessibility between Tokyo 23 wards and Narita airport do not make much difference.

3.2.2 Emergence of rent gap

Table 3 shows the annual closed rent gap in three periods: a year before the legislation (July 2017–June 2018), throughout

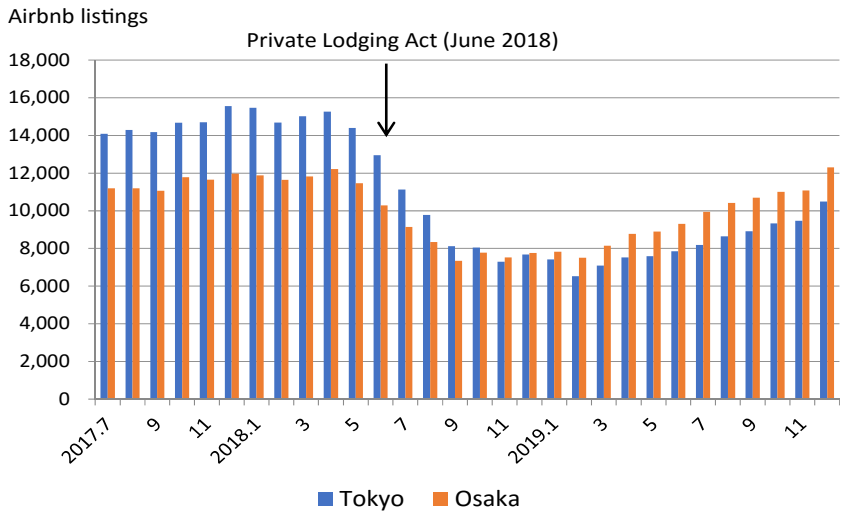

FIGURE 2. Number of Airbnb listings (July 2017–December 2019) and Private Lodging Act of 2018

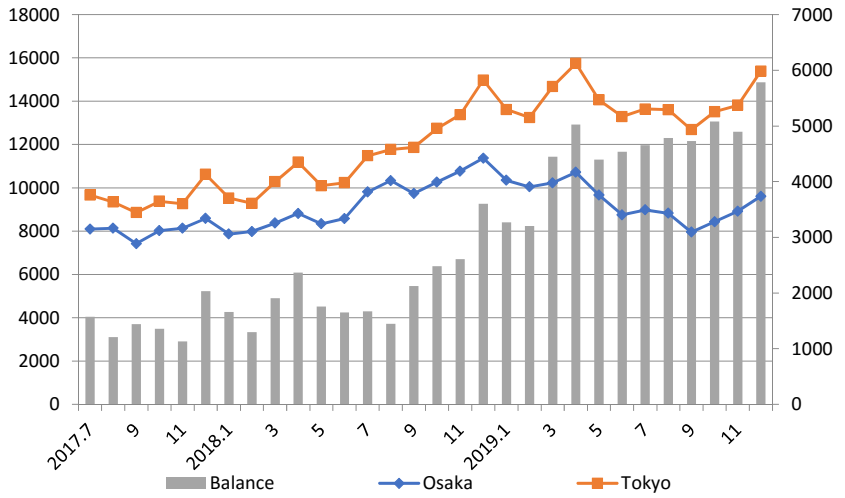

FIGURE 3. Airbnb daily rate and the balance between Tokyo and Osaka (July 2017–December 2019)

the legislation (July 2018–June 2019), and a year after the legislation (July 2019–December 2019). This periodization allows us to examine the effects of legislation for the closed rent gap: "high current impact" by STRs. It is obvious that the closed rent gap in Osaka is considerably larger than that of Tokyo. The gap is almost the same for each period, approximately three times larger. The calculation of long-term rental's revenue, as mentioned earlier, includes unoccupied housing so that the actual closed rent gap is larger than shown in the Table 3. Both cities' closed rent gaps have decreased following the legislation which is especially true in Tokyo. However, this trend changed a year after legislation that the increasing tendency is pronounced in Tokyo. The table also indicates the open rent gap in 2019. The open rent gap "high risk of future impact by STRs" is larger in Tokyo than that of Osaka.

Figures 6 and 7 show the different closed rent gap, and its change by ward-scale in Tokyo and Osaka. There is a tendency that more Airbnb listing, more likely to decrease the closed rent gap throughout the legislation in Chuo-Ward and Naniwa-Ward in Osaka. However, the Nishinari-Ward is exception to this rule. In Tokyo, four wards experienced the decrease in closed rent gap throughout the legislation, and two wards shows the same trend a year after the legislation. Closed rent gap of Sumida-Ward, Taito-Ward, and Toshima-Ward have increased throughout and a year after the legislation.

Figure 8 shows the open rent gap in Tokyo and Osaka. In Osaka, open rent gap in five wards out of 23 (20.8%) exceeds 300%. Only Nishinari-Ward as hot spot of Airbnb listings does not apply to the case. Looking at spatial trend, wards located along the Osaka Bay shows higher open rent gap. In Tokyo, open rent gap in 16 wards of 23 (69.6%) are beyond 300%. Move farther from the main transportation hub Tokyo station, the suburban wards show larger open rent gap.

3.3 Result 3: Depopulation indicators and rent gaps

Table 4 shows three indicators related to depopulation: population change, share of unoccupied housing, and rent shift. Our assumption is that these are correlated with Airbnb activities and the rent gaps. These indicators show different trend between Tokyo and Osaka, and at the same time, between wards-scale (Table 4).

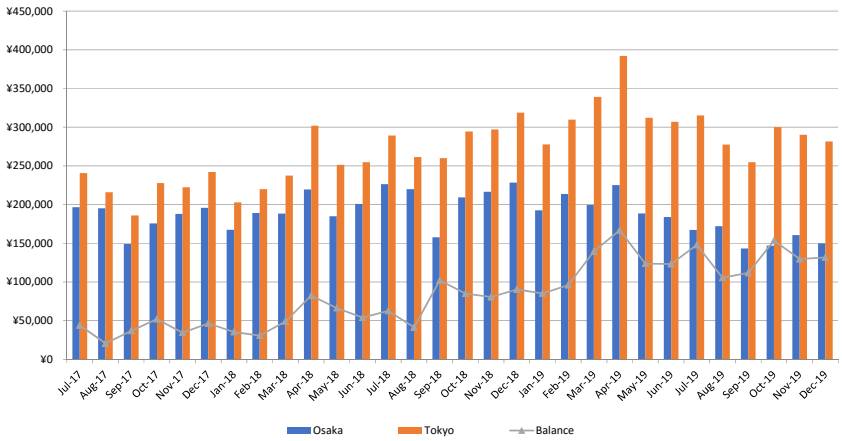

FIGURE 4. Airbnb monthly revenue and the balance between Tokyo and Osaka (July 2017–December 2019)

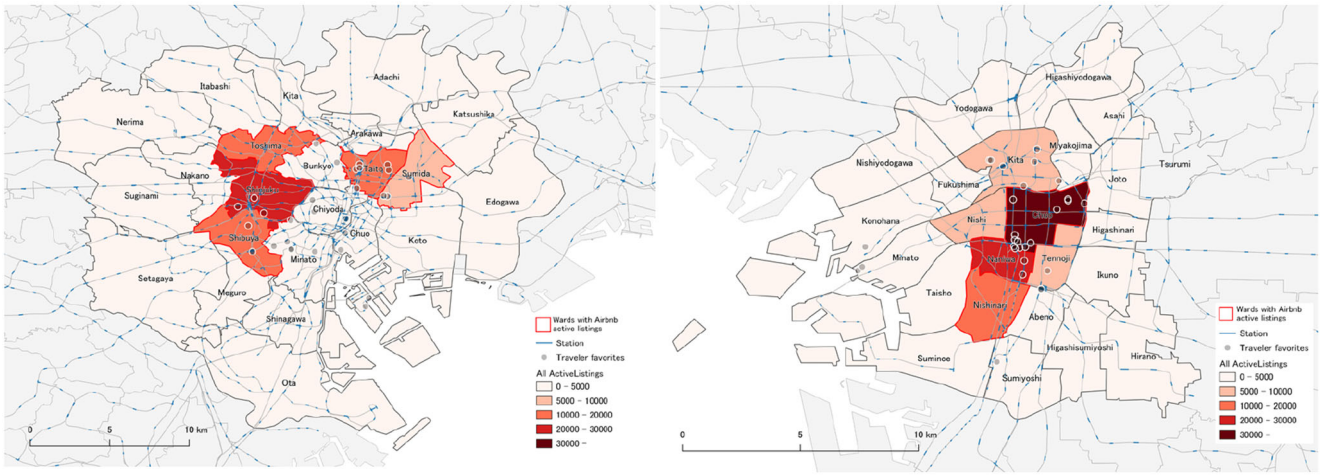

FIGURE 5. Active listings with tourists' attractions in Tokyo and Osaka (2019)

TABLE 3. Annual closed and open rent gaps (2017–2019)

	Closed rent gap					Open rent gap
	July 2017–June 2018	July 2018–June 2019	July 2019–December 2019	Change (2017–2018)	Change (2018–2019)	January 2019–December 2019
Tokyo	1.43%	1.09%	1.25%	−23.39%	14.07%	344.33%
Osaka	4.31%	3.64%	4.00%	−15.65%	9.94%	303.00%

Population decline has started throughout the country since 2005. However, this is not the case especially in Tokyo. All wards except Arakawa-Ward are experiencing population increase. In Osaka, 11 wards of 23 are experiencing population decline. Percentage of unoccupied housing is 13.6% in the country.[15] Osaka has higher, Tokyo has lower vacancy in citywide. We can find that 20 wards in Osaka have larger share of unoccupied housings compared to the national level. Finally, rent is increasing in both cities. Shrinking population generally leads to smaller demand for real estate market, but this does not apply to Tokyo and Osaka. Tokyo experiences more higher rent increase, 4.84% compared with Osaka, 2.99%.

Figures 9, 10, and 11 show the results of correlation analysis applied to "Tokyo and Osaka," Tokyo, and Osaka. Compare the correlation table of "Tokyo and Osaka" (Figure 9 left) with those of Tokyo (Figure 10 left) and Osaka (Figure 11 left) to see the different correlation between rent gaps and depopulated indicators.

3.3.1 ORG and depopulated indicators

There is negative correlation between the open rent gaps and population change in "Tokyo and Osaka." Less population, more likely to face "high risk of future impact by STRs". This correlation in Tokyo is stronger. One more correlative factor of open rent gap only found in Tokyo is rent shift. Lower rent, more likely to face "high risk of future impact." This trend does not apply to Osaka.

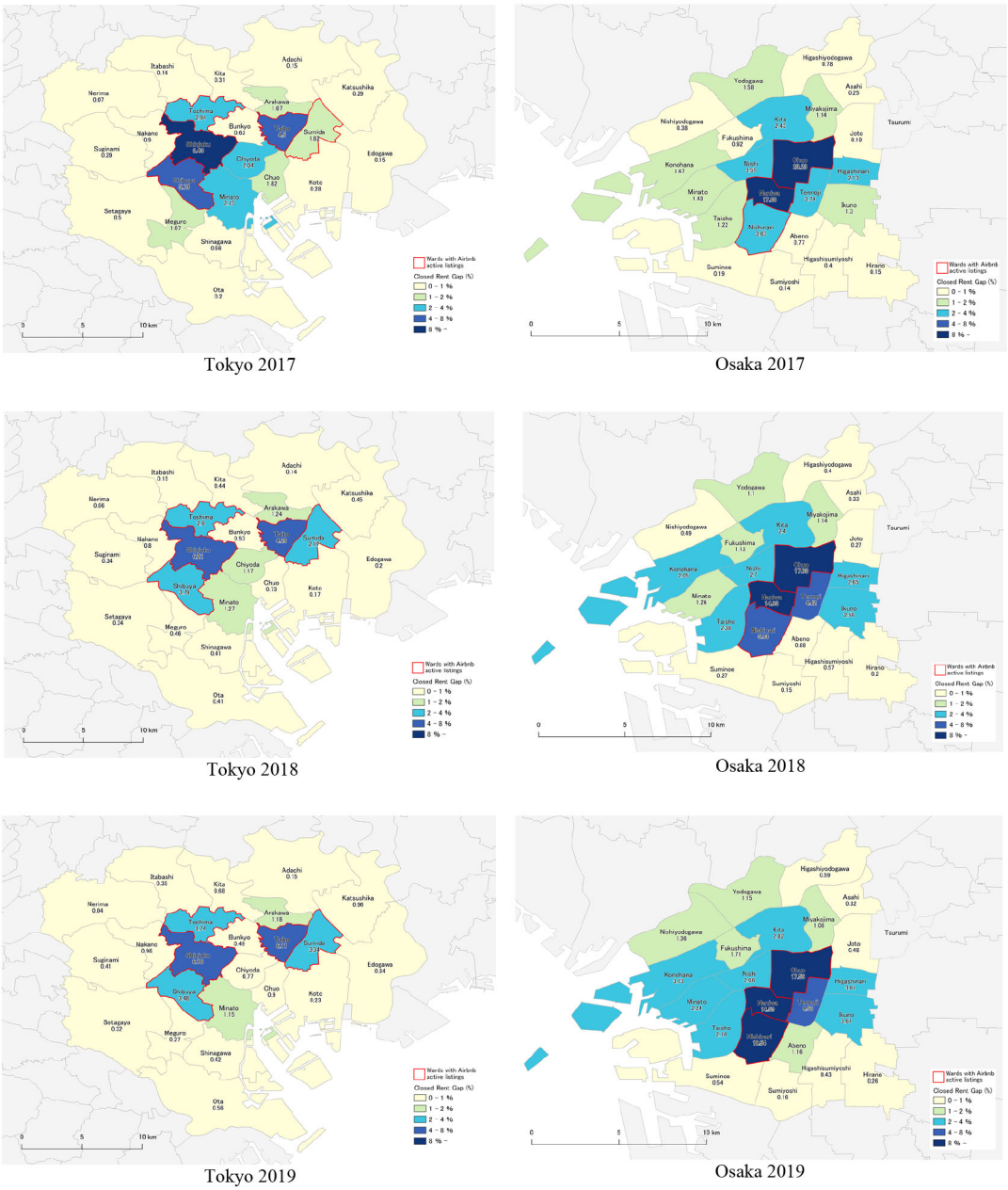

FIGURE 6. Closed Rent Gap in Tokyo and Osaka (July–December in 2017, 2018, 2019)

3.3.2 CRG throughout the legislation and depopulated indicators

As for closed rent gap throughout the legislation period, there is negative correlation between the closed rent gaps and population change in Tokyo and Osaka. Less population, more likely to experiencing "high current impact by STRs." This is same trend found for open rent gap. This correlation in Osaka is stronger. Integrating finding of open rent gap stated above, less population result in STR conversion in Osaka, and less population trigger STR conversion in Tokyo. What is unique in Tokyo is that lower rent leads to current STRs conversion which is the same case as future conversion. Landlords have already transformed and will convert their long-term rentals into STRs when rent get lower. Together, Tokyo and Osaka experience current impact by STRs where have high percentage of unoccupied housing, but this is not the case with Tokyo or Osaka alone.

3.3.3 CRG after the legislation and depopulated indicators

As for closed rent gap a year after the legislation, Osaka has tendency that higher rent, more current STRs conversion. This does not apply to Tokyo. The relationship between rent drop and STRs conversion cannot found a year after the legislation.

The following is an explanation of scatter diagram which shows the distinctive difference between "Tokyo and Osaka" (Figure 9 right) with those of Tokyo (Figure 10 right) and Osaka (Figure 11 right) by comparison of these three.

Strong correlation between unoccupied housing rate and closed rent gap is specific to "Tokyo and Osaka" (Figure 9 right). One peculiarity of "Tokyo" is the strong correlation between change in housing price and open rent gap (Figure 10 right) which is not found in Osaka. Change in population is

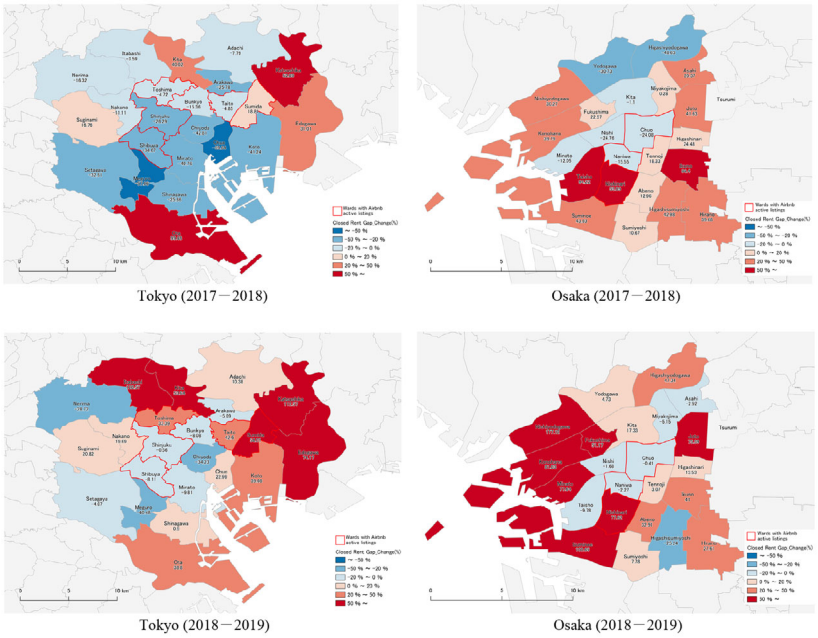

FIGURE 7. Change in Closed Rent Gap in Tokyo and Osaka (July–December in 2017, 2018, 2019)

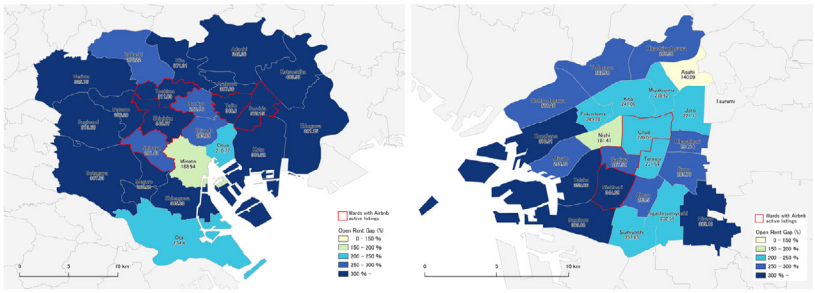

FIGURE 8. Open Rent Gap in Tokyo and Osaka (January–December 2019)

correlate most closely with annual change in closed rent gap in Osaka (Figure 11 right).

4. Discussion

4.1 Short-term tourist rentals as inbound tourism accommodation

This section explains the positive sides of Airbnb for tourism industry in depopulated society. How have listing, price per day, and monthly revenue of Airbnb increased, and where?

Number of listings both in Tokyo and Osaka has decreased following the national legislation. Closed rent gaps decreased in wards with hot spot of active listings. Increasing of Airbnb daily rate of in Tokyo implies that lower quality of STRs has been drove out from the STR market.

Interim decline of Airbnb listing has recovered since the early 2019, and its gap has expanded between Tokyo and Osaka. At the same time, daily rate is increasing in Tokyo but decreasing in Osaka during 2017 to 2019. We can assume several reasons for this trend. First, illegal Airbnb units were reduced by the legislation. Second, expectation for Tokyo 2020 Olympic game expands the demand for accommodation, induced investment for STRs. Third, high occupancy rate of hotel rooms is in great demand in Tokyo.

We also found that most wards with more tourist attraction have more Airbnb units; however, this does not apply to hot spot of Airbnb listing without attraction. These wards, Nishinari-Ward and Toshima-Ward, share certain characteristics which is high residential vacancy rate. Thus, the number of Airbnb listings is affected by the volume of tourist attractions and unoccupied housings. Unoccupied housing functions as resources to boost local economy.

The number of international tourist arrival has been increasing. Given the above, Airbnb industry may stimulate the national and local economies after COVID-19 period. Tokyo will likely receive larger economic benefits where has more Airbnb activities with more revenue.

4.2 Displacement by rent gap

This section examines negative impact of Airbnb by the rent gaps. How has rent gaps emerged and what kind of depopulated indicators affects the high impact of STRs?

First, our results reveal how and where (with what kind of characteristics) did the rent gaps emerged in Japan. Landlords in Osaka, more depopulation with more unoccupied housing, have already shifted their long-term rentals to STRs. Tokyo, increasing population with less unoccupied housing, will have

TABLE 4. Population decline, unoccupied housing, housing prices in Tokyo and Osaka

	Change of population (2015–2010)/ 2010 (%)	Unoccupied housing (%)	Change of housing price (2019–2017)/ 2017 (%)		Change of population (2015–2010)/ 2010 (%)	Unoccupied housing (%)	Change of housing price (2019–2017)/ 2017 (%)
Tokyo	3.66	10.38%	4.84	**Osaka**	0.97	17.07%	2.99
Chiyoda	23.96	10.72%	7.92	Miyakojima	2.04	17.39%	2.85
Chuo	15.01	11.85%	7.89	Fukushima	7.72	12.05%	2.87
Minato	18.60	12.37%	7.43	Konohana	1.66	17.76%	3.25
Shinjuku	2.22	11.41%	4.83	Nishi	11.28	13.89%	2.44
Bunkyo	6.34	9.46%	4.81	Minato	−3.43	20.34%	3.56
Taito	12.59	9.77%	6.40	Taisho	−6.29	19.61%	2.82
Sumida	3.50	10.44%	6.20	Tenoji	8.53	13.06%	3.71
Koto	8.09	7.73%	5.78	Naniwa	12.99	17.26%	3.04
Shinagawa	5.90	9.82%	4.26	Nishiyodogawa	−2.07	16.84%	4.09
Meguro	3.46	8.03%	3.78	Higashiyodogawa	−0.60	18.37%	2.62
Ota	3.42	11.33%	4.61	Higashinari	0.41	19.62%	3.27
Setagaya	2.99	9.64%	3.18	Ikuno	−2.87	19.85%	2.75
Shibuya	9.80	10.12%	5.18	Asahi	−0.92	18.12%	1.98
Nakano	4.28	11.27%	2.86	Joto	−0.68	12.74%	3.17
Suginami	2.63	8.56%	3.08	Abeno	1.20	16.11%	2.54
Toshima	2.28	13.25%	4.17	Sumiyoshi	−0.86	20.05%	2.24
Kita	1.65	10.89%	3.24	Higashisumiyoshi	−3.38	21.80%	2.27
Arakawa	4.41	11.82%	4.12	Nishinari	−8.27	22.50%	3.49
Itabashi	4.87	10.90%	3.39	Yodogawa	2.40	16.74%	3.09
Nerima	0.78	9.67%	3.47	Suminoe	−3.32	14.68%	3.19
Adachi	-1.95	11.14%	4.49	Hirano	−1.69	15.85%	1.61
Katsushika	0.07	11.82%	3.28	Kita	12.03	13.64%	3.71
Edogawa	0.34	9.69%	3.21	Chuo	18.28	17.77%	3.69

Tokyo and Osaka

		Population (2015–2010/2010)	Vacancy Rate (2018)	Housing Price (2019–
ORG of January–December 2019	Pearson's correlation coefficient	−.332*	−.275	−.009
	p value	.021	.059	.951
	square sum and	−5960.943	−3006.965	−35.697
	covariance	−126.829	−63.978	−.760
	frequency	48	48	48
Annual Change of CRG(2018–2017)/2017	Pearson's correlation	−.572**	.382**	−.447**
	p value	.000	.007	.001
	square sum and	−7467.382	3037.011	−1271.603
	covariance	−158.880	64.617	−27.055
	frequency	48	48	48
CRG Change 2017→2018 (6 months)	Pearson's correlation	−.572**	.393**	−.431**
	p value	.000	.006	.002
	square sum and	−6917.643	2901.709	−1134.933
	covariance	−147.184	61.738	−24.148
	frequency	48	48	48
CRG Change 2018→ 2019(6 months)	Pearson's correlation	−.353*	.105	−.109
	p value	.014	.479	.462
	square sum and	−4840.593	874.360	−325.006
	covariance	−102.991	18.603	−6.915
	frequency	48	48	48

**. Correlation coefficient is significant (both sides) at 1% level
*. Correlation coefficient is significant (both sides) at 5% level

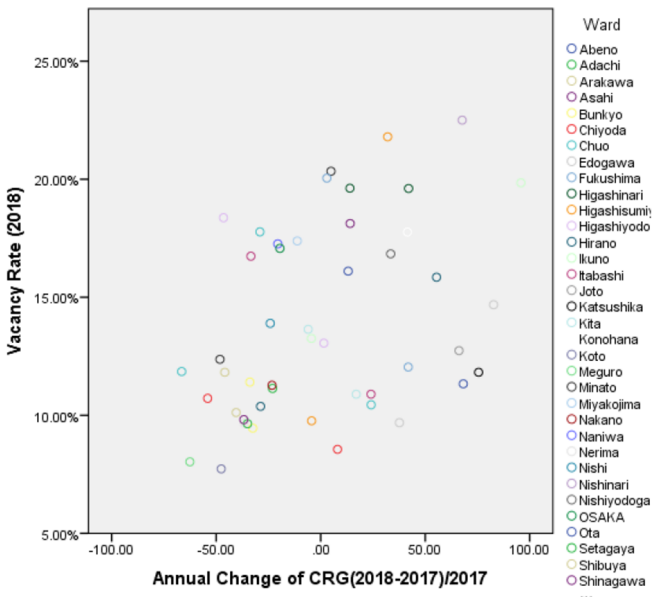

FIGURE 9. Correlation between rent gaps and depopulated indicators for "Tokyo and Osaka"

greater potential impact on rental housing market in the near future. We can assume the following reason for this difference. First, residential vacancy in Osaka is 6.7 points higher than that of Tokyo. Lower occupancy of long-term rentals is being converted into STRs in Osaka. However, Tokyo is less needed to transfer LTRs with higher occupancy. Second, landlords in Tokyo can set higher rent than that of Osaka which has not enough economic motive to transfer LTRs to STRs. Third,

Tokyo

		Population (2015–2010/2010)	Vacancy Rate (2018)	Housing Price (2019–
ORG of January–December 2019	Pearson's correlation coefficient	−.629**	−.220	−.544**
	p value	.001	.302	.006
	square sum and	−4747.511	−358.873	−1020.757
	covariance	−206.414	−15.603	−44.381
	frequency	24	24	24
Annual Change of CRG(2018–2017)/2017	Pearson's correlation	−.468*	.187	−.411*
	p value	.021	.381	.046
	square sum and	−2607.744	225.725	−568.390
	covariance	−113.380	9.814	−24.713
	frequency	24	24	24
CRG Change 2017→2018 (6 months)	Pearson's correlation	−.477*	.182	−.406*
	p value	.018	.394	.049
	square sum and	−2515.243	207.885	−531.009
	covariance	−109.358	9.038	−23.087
	frequency	24	24	24
CRG Change 2018→ 2019(6 months)	Pearson's correlation	−.312	.199	−.264
	p value	.138	.352	.212
	square sum and	−1860.411	256.384	−391.774
	covariance	−80.887	11.147	−17.034
	frequency	24	24	24

**. Correlation coefficient is significant (both sides) at 1% level
*. Correlation coefficient is significant (both sides) at 5% level

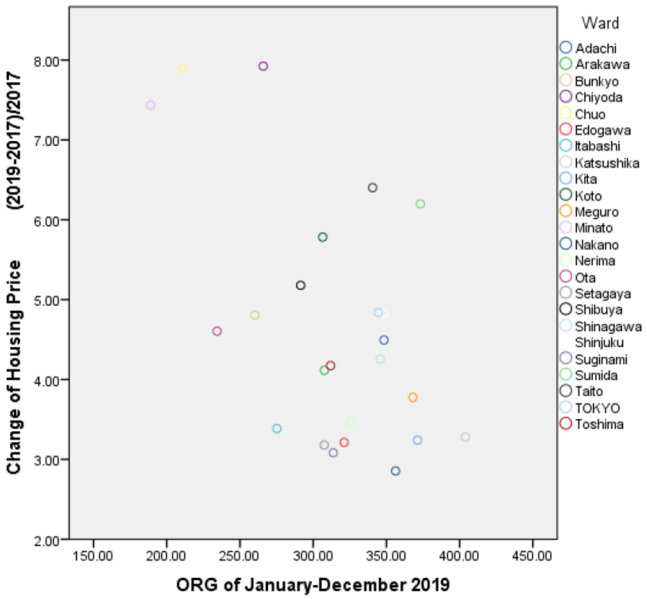

FIGURE 10. Correlation between rent gaps and depopulated indicators for Tokyo

Osaka

		Population (2015–2010/2010)	Vacancy Rate (2018)	Housing Price (2019–
ORG of January–December 2019	Pearson's correlation coefficient	−.408*	.279	.076
	p value	.048	.187	.724
	square sum and	−3327.743	982.988	56.422
	covariance	−144.684	42.739	2.453
	frequency	24	24	24
Annual Change of CRG(2018–2017)/2017	Pearson's correlation	−.567**	.066	−.051
	p value	.004	.758	.813
	square sum and	−3320.465	167.938	−27.184
	covariance	−144.368	7.302	−1.182
	frequency	24	24	24
CRG Change 2017→2018 (6 months)	Pearson's correlation	−.568**	.223	−.102
	p value	.004	.295	.636
	square sum and	−3144.395	533.349	−51.388
	covariance	−136.713	23.189	−2.234
	frequency	24	24	24
CRG Change 2018→ 2019(6 months)	Pearson's correlation	−.350	−.098	.472*
	p value	.094	.648	.020
	square sum and	−2447.639	−296.604	300.670
	covariance	−106.419	−12.896	13.073
	frequency	24	24	24

**. Correlation coefficient is significant (both sides) at 1% level
*. Correlation coefficient is significant (both sides) at 5% level

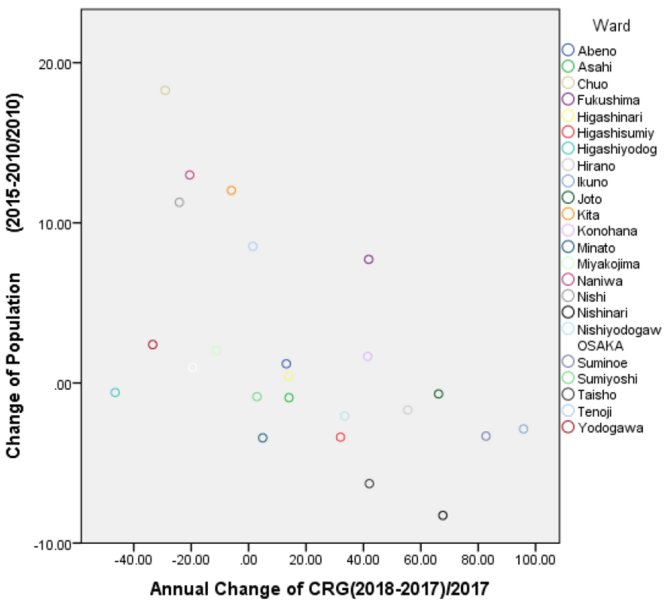

FIGURE 11. Correlation between rent gaps and depopulated indicators for Osaka

higher occupancy rate of Tokyo boosts the demand for STRs as an alternative for hotel rooms. Tokyo has large number of wards with "High risk of future impact by STRs," and it is located in suburb. Suburban wards have less population increase and less rent increase (Table 3). Hoffman suggests that "the studies show that Airbnb listings are not distributed throughout the city but tend to be concentrated in a minority of neighborhoods. These neighborhoods include those close to the central city, near tourist attractions, restaurant, and public transportation as well as areas that have been gentrifying.[13] We reveal in Tokyo that wards far from the central city have "High risk of future impact by STRs." It is certain from the above evidence that the legislation failed in accomplishing its purpose: "contributing to improve the stability of people's lives." Well-functioning Airbnb regulations are essential to ensure stable residency for neighbors.

Second, we suggest that the rent gaps are strongly affected by depopulated indicators which are population change and rent shift. Wachsmuth[4] analyzed the rent gap by racial effects, but we add the Japanese societal context to explain the rent gaps. The distribution of the rent gaps is geographically uneven which have been subject to depopulation. The first correlated factors with the rent gaps are population decline. Less population leads to current and potential future risk of STRs conversions which make Japanese metropolitan area more unlivable cities to sustain their residency. Second factor is the LTRs' rent shift. Our results show the exact opposite relationship between the rent gaps and rent shift. In Tokyo, higher rent does not induce STRs conversion throughout the legislation period. Landlords would be content with the rental revenue from the LTRs, and do not have less motivation to convert LTRs to STRs. They could compare the rent revenue of LTRs and STRs to their decision. Future possibility of STRs conversion was found in rent drop areas. Thus, less revenue of LTRs induce affordability crisis. This suggests that affordability will decline without adequate regulation. On the other hands in Osaka, higher rent is correlated with the open rent gap. This implies that STRs conversion in Osaka has different motivation to start STRs business. For instance, Tokyo may have more commercially oriented host, and Osaka with more family-run Airbnb. Other factor we focus was housing vacancy. This proved to be not strong factor explaining the rent gaps, however, we found that common characteristic of hot spot Airbnb listing without tourist attraction have the highest rate of unoccupied housing units (Figure 5).

Previous studies show that "displacement and disruption were more likely to affect black residents" in New York.[13] Our results in Japan demonstrate that displacement is more likely to affect area with less population, and the future impact of STRs conversion will increase in area with lower rent revenue of LTRs. Affordable neighborhoods in Tokyo are facing high risk of STRs conversion. Several researchers[7,30] have emphasize that not all cities should adopt same strategy to regulate Airbnb, because its impacts can be different.[9] The rent gaps affected by the countrywide and local context in Japan require local governments to tougher limits on STRs through the lens of affordability crisis and displacement to sustain Japanese metropolitan cities livable. There is continuing need to take into consideration the depopulated indicator affecting rent gaps and local context to review their local ordinance.

Third, our results in Japan are consistent with Wachsmuth[4]'s finding: "Airbnb-induced gentrification without redevelopment, requiring little capital, and providing a quick turnabout." We show that this is also true even in depopulated society with lower demand for real estate market. We may add the following peculiar characteristics of Japanese real estate market and housing policy further accelerate the conversion of LTRs to STRs. First, population decline leads to lower demand for real estate. Second, the maintenance of existing housing does not raise the property value. In general, the older housings are, the lower the property value is. Third, less importance on the rented housing sector of housing policy. Japan does not have rental assistance programs for private rental housing which discourage landlord to invest long-term rental housings. Landlords might switch over un-occupied housings into short-term rentals without government incentives by housing policy. These suggest that there is room to restructure regulation for STRs integrated with general housing policies.

4.3 Limitation

Limitations in our study are summarized into the following points. First, we did not find the cause-and effect relationship between the rent gaps and depopulated indicators. Rather, it remained estimated of relationship. Also, depopulated indicators are not independent, but we did not seek those dependence relationship. Second, we calculated the rent gaps, but this does not reveal the actual impact of STRs such as rent increase, displacement, and affordability crisis. At the same time, our research did not find any evidence of the displacement and demonstrates its process: how residents and tenants are forced to leave their house and communities. As mentioned in the introduction section, our research is depended on the assumption that emergence of rent gap increases incentive for real estate capital, and drives up housing prices, attracts more affluent newcomers, and displaces existing poorer resident.[4] Third, we did not fully evaluate STRs activities from multiple views of its impacts. Japan's depopulation requires us to assess and reconsider the design of regulations based on the positive and negative perspective. Fourth, we cannot declare unoccupied housings were converted to STRs. We did not identified the attribution of existing housing stocks transferred to STRs. Future research is needed to identify the motivation of Airbnb host, and what kind of housing stock they are using to provide STRs units. Grisdale[3] found that "the majority of Airbnb's revenue within the Toronto derives from full-time, commercially oriented hosts," however, family-run STRs business may give positive impact on local revitalization. Also, we may provide statistically significant data by narrowing down qualified residential buildings which follow the Hotels and Inns Act and the Private Lodging Act. Finally, our analysis does not cover the post-COVID-19 effects on STRs transfer or real estate market. COVID-19 has had a global effect on people's lifestyles, and this may change the real estate demands. The number of STRs might be decreased after Tokyo Olympic. Post-COVID-19 impacts of STRs would be next research agenda in Japan.

5. Conclusion

This article reveals the Japanese consequences of short-term tourist rentals by exploring how emergence of rent gap has elicited real estate capital to direct housing investment transferring long-term residential rental housing to touristic rentals. Our results demonstrate that landlords in Osaka have already removed a significant number of residential rental units from the housing market, and those of Tokyo is likely to evict their tenants to shift more profitable touristic short-term rentals when their long-term rentals' rent revenue shrinks. We concluded that the rent gaps affected by the depopulated societal context require tougher limits on touristic rentals to mitigate "transnational displacement." The future of community livability depends upon municipalities' ordinance as well as how they could leverage unoccupied housing to survive an era of shrinking economy.

Disclosures

The author has no conflicts of interest to declare.

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Research data are not shared.

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