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The Costs of Urban Agglomeration: Evidence from the Inbound Tourism Boom in Japan*

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Abstract

This study provides novel insights on the hypothesis of tougher demand competition in larger cities, focusing on the accommodation sector. In recent years, Japan has experienced a sudden increase in foreign tourists, which has increased the room occupancy rates of hotels, especially in large cities, such as Tokyo and Osaka. Large cities also attract domestic visitors from across the country, meaning that the inbound tourism boom results in a situation where hotel demand of Japanese visitors is in direct competition with that of foreign visitors. This study finds that the increase in hotel demand of foreign visitors has increased the difficultly for Japanese visitors to find vacant rooms (vice versa) since the beginning of inbound tourism boom around 2013, especially in both business and city hotels in large cities, suggesting that visitors to larger cities face higher costs of searching for vacant rooms.

JEL classification: R10, R11, R12, Z30
Keywords: Tourism, Demand competition, Urban agglomeration, Micro-geographic data

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1 Introduction

This study provides novel insights on the hypothesis of tougher demand competition in larger cities, which can be viewed as costs of urban agglomeration. Large markets (i.e., demand agglomeration) attract service firms because of the service characteristics of non-tradability, non-storability, and intangibility. However, when a demand boom occurs, demand often exceeds supply capacity. In such a situation, consumers must decide whether to wait or to search for other service suppliers. In other words, consumers suffer from the costs of waiting or searching under demand competition. Importantly, excess demand is a trigger for waiting or searching costs, and these costs are not always observed. Therefore, this study focuses on the identification of demand competition and whether this is likely to occur in large cities.[1,2]

To examine the timing of demand competition, this study focuses on the inbound tourism boom in Japan. Japan has experienced a sudden increase in international tourists since 2012 (Ministry of Land, Infrastructure, Transport and Tourism, 2019). Figure 1 depicts a sharp increase to 10 million in foreign visitors in 2013, 20 million in 2016, and 30 million in 2018, which substantially exceeds the policy goals of the Japanese government (Japan Tourism Agency, 2012).

[Figure 1]

The inbound tourism boom of 2012 is an ideal situation to identify the timing of demand competition because a critical assumption is that supply capacity is fixed for increasing demand. For example, an increase in foreign tourists was not foreseeable for most of the accommodations before 2012. In addition, different from other services, such as restaurants and retail stores, increasing hotel capacity (e.g., constructing a new building) requires a few years even if accommodations foresee an inbound tourism boom. Thus, the inbound tourism boom can be viewed as a positive demand shock under fixed supply capacity.

Another feature of this study is an analysis of how city size affects the degree of demand competition. The literature on urban economics and economic geography has studied where and why large cities are created (e.g., Fujita et al., 1999; Rosenthal and Strange, 2004; Duranton

[1] In this study, we refer to demand competition as a situation of excess demand. When demand temporally exceeds supply capacity, the scarcity leads to competition between consumers in the short term. Aggarwal et al. (2013) focus on this kind of situation as a consumer competition in the literature on marketing and advertising.

[2] Consumers also must pay additional pecuniary costs if hotels increase prices because of a positive demand shock. This phenomenon is not investigated because room-price data was limited.

and Puga, 2004; Combes et al., 2008). To explain this mechanism , Krugman (1991, 1993) introduces the concepts of first nature and second nature to new economic geography. First nature, which is originally conceptualized by Cronon (1991), reflects exogenous factors tied to a location, such as natural resources, amenity, and landscape. Second nature reflects endogenous factors tied to location, such as economic activities and social culture. The new economic geography model is based on the the second nature and models the process of city growth through residential mobility.

This study focuses on a new aspect that large cities also attract visitors (namely, short visits from residents of other cities). Large cities attract foreign visitors and domestic visitors from across the country for sightseeing and business travel. Figure 2 shows the room occupancy rates for selective prefectures by type of accommodations. Since the late 2010s, these rates have remained high (between 80% and 90%) in the two largest cities in Japan (Tokyo and Osaka), particularity for business and city hotels. Although Morikawa (2016) finds that an increase in foreign guests improves capacity utilization, which benefits the accommodation sector on the supply side between 2011 and 2014, this study emphasizes the possibility that the excess demand under fixed supply capacity generates costs of waiting or searching on the demand side.

[Figure 2]

This study contributes to the literature of tourism research by discussing the costs of urban agglomeration in the accommodation sector. The literature has mainly focused on the agglomeration effects of location choice of hotels (e.g., Canina et al., 2005; Yang et al., 2014). Measurements of the impacts of agglomeration or transportation development on hotel performance have also been performed (e.g., Peiró-Signes et al., 2014; Marco-Lajara et al., 2016). Although these studies have focused on the supply-side effects of agglomeration, this study highlights the consumer-side effects of agglomeration.

This study uses the monthly panel data of each accommodation along with the origin information of visitors to uncover the demand competition between Japanese and foreign visitors. After controlling for regional fixed effects as a first nature and seasonal trends by using a year-on-year difference, this study finds that an increase in hotel demand of foreign visitors increased the difficultly for Japanese visitors to find vacant rooms (vice versa), especially in business and city hotels since 2013. Furthermore, this demand competition increases in larger

cities.

This finding leads to a critical implication for the development of the service industry, which tends to concentrate in large cities. The empirical literature has often emphasized the productivity advantage of large cities (e.g., Morikawa, 2011; Combes et al., 2012) and focused on benefits from agglomeration on the supply side. Notably, consumer aspect has not been well studied in the literature on agglomeration economies. This study offers suggestive evidence that the demand boom under fixed capacity results in costs of waiting or searching for consumers, which tend to be higher in larger cities. Based on the literature of consumer search, such as Nelson (1970) and Stahl (1982), consumers are likely to have limited information on products and services. Thus, complementary information provided in a timely manner to promote demand dispersion may be an effective meas to reduce those costs and increase consumers' satisfaction.

The remainder of this paper is organized as follows. Section 2 explains the data. Section 3 explains the empirical framework. Section 4 discusses estimation results, and Section 5 concludes.

2 Data

2.1 Overnight Travel Statistics Survey

This study uses the monthly accommodation-level microdata of the Overnight Travel Statistics Survey (Ministry of Land, Infrastructure, Transport and Tourism). The data period in this study is from January 2007 to December 2017. The Overnight Travel Statistics Survey classifies accommodation into five types (2007Q1–2010Q1) and six types (2010Q2–2017Q4). This study focuses on four types of accommodation: ryokan (traditional Japanese inn), resort hotel, business hotel, and city hotel.[3]

The Overnight Travel Statistics Survey contains information on total guests nights per month, total guests per month, number of rooms, maximum overnight guest capacity, and number of employees. Total guest nights per month is further classified into domestic residents

[3]Business hotel is generally defined as accommodation with Western-style rooms and beds that mainly specialized in overnight stays. Business hotels typically offer options for breakfast and accompanying services for overnight stays. City hotel is generally defined as an accommodation located in central business districts that simultaneously offers a variety of luxury services, such as a restaurant, wedding, hall, or spa. Resort hotel offers similar services as a city hotel but is located in places for leisure. Ryokan is an accommodation with Japanese-style rooms and beds. The quality of ryokans varies a lot, and a high-class ryokan is typically located in places for leisure.

and foreigners (based on nationality).[4] Notably, monthly data is only available for demand-side information, but the supply-side information (i.e., capacity, number of rooms, and number employees) is investigated as of January in the survey year.[5]

The unique accommodation codes included in the Overnight Travel Statistics Survey allows us to construct monthly panel data for each accommodation. This study uses year-on-year differences to control for seasonal trends instead of monthly first-difference.[6] Using year-on-year difference is also important because supply-side information (i.e., capacity and number of workers) is constant within a year.

2.2 Urban Agglomeration Variable

Following the urban economics literature, this study uses local employment as an urban agglomeration or city size variable.[7] A contribution of this study is that we construct urban agglomeration variable based on micro-geographic data. First, geographic locations of each accommodation are identified (i.e., longitude and latitude) by using a geocoding technique. Location information (longitude and latitude) of each accommodation is obtained by the Address Geocoding of ArcGIS. Next, their locations are matched with Grid Square Statistics (Ministry of Internal Affairs and Communications) at approximately 1 km by 1 km level.[8] In Figure 3, this study constructs urban agglomeration variable as local employment within a 9 km radius from the location of each accommodation.

This study also considers two classifications of city size based on hotel location. Large cities

[4]The Overnight Travel Statistics Survey identifies foreign visitors' nationality, which is not used in this study. Tanaka (2013) and Morikawa (2018) use the nationality of foreign visitors to investigate international travel flows.

[5]For this reason, Morikawa (2017) uses only the January data of each year and constructs yearly panel data of each accommodation. This study constructs monthly panel data of each accommodation but uses a year-on-year difference to solve this data problem.

[6]Pearce and Grimmeau (1985) discuss the causes of seasonality of hotel demand in Spain and show the heterogeneity across the nationality of tourists.

[7]Whereas local employment reflects population distribution in the daytime, local population reflects population distribution in the night-time. The gap in population distribution in the daytime and night-time tends to increase in city size. This study uses local employment, which is related with short visits from residents of other domestic cities and countries.

[8]The number of workers in the Grid Square Statistics is based on the 2006 Establishment and Enterprise Census (Ministry of Internal Affairs and Communications), the 2009 and 2014 Economic Census for Business Frame (Ministry of Internal Affairs and Communications), and the 2012 and 2016 Economic Census for Business Activity (Ministry of Internal Affairs and Communications and Ministry of Economy, Trade and Industry). A yearly linear interpolation is implemented among the censuses. Grid Square Statistics for the 2016 Economic Census for Business Activity were not officially released as of August 2019. This study originally aggregates geocoded data of all firms surveyed in the 2016 Economic Census for Business Activity by using the mesh code of the 1 km by 1 km level.

are classified if the logarithm of the urban agglomeration variable is greater than 12 (approximately, 162,755 workers within 9 km a radius). Small cities are classified if the logarithm of the urban agglomeration variable is less than 12. In Table 1, this threshold refers to the average location of the business hotels where Japanese guests stayed.

[Figure 3]

2.3 Descriptive Statistics

Tables 1 and 2 present the descriptive statistics of variables used in the regression analysis by type of accommodations. The sample size of ryokan is larger than the other types. The urban agglomeration variable in Table 1 shows that business and city hotels are, on average, located in large cities, compared with ryokan and resort hotels.

The growth rate of the number of guest nights per month for foreign guests in Table 2 is positive for all types of accommodations, which reflects the effects of the inbound tourism boom. The number of foreign guests per month was lower than that of Japanese guests, but the growth rate was higher for foreign tourists.

[Tables 1–2]

3 Empirical Framework

This study considers a situation in which the demand of one person affects the demand of others. The demand competition between domestic and foreign visitors can be expressed as the following structural equations:[9]

$$
\begin{cases}
\log(\text{Guest}^{\text{J}}_{iaym}) &= \pi^{\text{J}}_{1y}\log(\text{Guest}^{\text{F}}_{iym}) + \pi^{\text{J}}_{2}\log\left(\text{City}_{iy}\right) \\
&\quad + \pi^{\text{J}}_{3}\log(\text{Capacity}_{iy}) + \pi^{\text{J}}_{4}\log(\text{Emp}_{iy}) + \eta^{\text{J}}_{i} + \kappa^{\text{J}}_{a} + \psi^{\text{J}}_{y} + \psi^{\text{J}}_{m} + u^{\text{J}}_{iaym} \\
\log(\text{Guest}^{\text{F}}_{iaym}) &= \pi^{\text{F}}_{1y}\log(\text{Guest}^{\text{J}}_{iym}) + \pi^{\text{F}}_{2}\log\left(\text{City}_{iy}\right) \\
&\quad + \pi^{\text{F}}_{3}\log(\text{Capacity}_{iy}) + \pi^{\text{F}}_{4}\log(\text{Emp}_{iy}) + \eta^{\text{F}}_{i} + \kappa^{\text{F}}_{a} + \psi^{\text{F}}_{y} + \psi^{\text{F}}_{m} + u^{\text{F}}_{iaym}
\end{cases}
\tag{1}
$$

[9] As a production function of accommodation, Morikawa (2017) considers a similar regression model in which the dependent variable is the total number of guest nights. This study decomposes total number of guest nights into those of Japanese and foreign guests.

where $\text{Guest}^{\text{J}}_{iym}$ is the number of guest nights per month of Japanese in hotel i in year y and month m, $\text{Guest}^{\text{F}}_{iym}$ is the number of gust nights per month of foreigners in hotel i in year y and month m, City_{iy} is the urban agglomeration or city size variable for hotel i, Capacity_{iy} is the maximum overnight guest capacity of hotel i, Emp_{iy} is the number of employees of hotel i as of January in year y, η^{type}_{i} is a fixed factor for hotel i, κ^{type}_{a} is a fixed factor for location a, ψ^{type}_{y} is a fixed factor for year y, ψ^{type}_{m} is a fixed factor for month m, u^{type}_{iaym} is an error term for hotel i, and type $\in$ (J, F) indicates Japanese and foreign, respectively.

To capture the timing of demand competition induced by the inbound tourism boom, this study considers time-varying parameters π^{J}_{1y} and π^{F}_{1y}. The parameters should become negative if the demands of Japanese and foreign guests start to compete in hotel i under a fixed supply. The parameters can be positive if the demands of Japanese and foreign guests are complementary in hotel i. For example, the common positive shocks between Japanese and foreign guests increase their demands simultaneously. Importantly, room occupancy rate must be sufficiently low if parameters π^{J}_{1y} and π^{F}_{1y} are positive. For this reason, this study conducts regressions by type of accommodation. In Figure 2, ryokan and resort hotels show relatively low room occupancy rates, whereas business and city hotels show relatively high room occupancy rates.

This study estimates structural equations (1) to identify the timing of demand competition between Japanese and foreign visitors.[10] However, estimation problems must be solved. First, this study controls for fixed effects of hotel, region, and season by using the year-on-year difference as follows:

$$
\begin{cases}
\Delta_y \log(\text{Guest}^{\text{J}}_{iaym}) &= \pi^{\text{J}}_{1y}\Delta_y \log(\text{Guest}^{\text{F}}_{iym}) + \pi^{\text{J}}_{2}\Delta_y \log\left(\text{City}_{iy}\right) + \theta^{\text{J}} \log\left(\text{City}_{i,y-1}\right) \\
&\quad + \pi^{\text{J}}_{3}\Delta_y \log(\text{Capacity}_{iy}) + \pi^{\text{J}}_{4}\Delta_y \log(\text{Emp}_{iy}) + \psi^{\text{J}}_{y} + \Delta_y u^{\text{J}}_{iaym}, \\
\Delta_y \log(\text{Guest}^{\text{F}}_{iaym}) &= \pi^{\text{F}}_{1y}\Delta_y \log(\text{Guest}^{\text{J}}_{iym}) + \pi^{\text{F}}_{2}\Delta_y \log\left(\text{City}_{iy}\right) + \theta^{\text{F}} \log\left(\text{City}_{i,y-1}\right) \\
&\quad + \pi^{\text{F}}_{3}\Delta_y \log(\text{Capacity}_{iy}) + \pi^{\text{F}}_{4}\Delta_y \log(\text{Emp}_{iy}) + \psi^{\text{F}}_{y} + \Delta_y u^{\text{F}}_{iaym},
\end{cases}
\tag{2}
$$

where Δ_y indicates year-on-year difference. In addition, this specification includes the one-year lag of urban agglomeration variable $\text{City}_{i,y-1}$ to account for scale effect because using a temporal difference annihilates scale information. If $\theta^{\text{type}} \neq 0$, the scale of urban agglomeration affects hotel demand dynamics.

[10] Reduced form is estimated in Appendix C.

Another estimation problem is endogeneity in the demand variables, namely $\Delta_y \log(\text{Guest}^{\text{J}}_{iaym})$ and $\Delta_y \log(\text{Guest}^{\text{F}}_{iaym})$ in the structural equation model. Ideal instrumental variables should satisfy two conditions. First, a shock must affect only the hotel demand of foreign and Japanese visitors in the structural equations (2). Second, instruments have strong explanatory power on the hotel demand of foreign and Japanese visitors.

This study uses monthly lagged variables of the number of foreign and Japanese guests. Obviously, a large number of guests is positively correlated with a large number of guest nights as a strong first stage. As an exclusion restriction, this study considers the information gap between foreigners and Japanese. For example, an increasing number of Japanese guests in a hotel in a short period is likely to have greater impacts only on Japanese guests because of the information spillover effect. Thus, a reasonable assumption that information available in Japanese does not reach foreigners quickly. The same logic is assumed for the foreign guests: information available in foreign languages does not reach the Japanese quickly.

4 Estimation Results

4.1 Detecting Demand Competition between Japanese and Foreign Guests

Tables 3 and 4 present the IV estimation results of demand competition between the Japanese and foreign guests with the coefficient estimates decomposed by year.[11]

Table 3 shows the time-varying impacts of foreign tourists' demand on that of Japanese visitors (Japanese ← foreigner). Columns (3) and (4) show that the increase in foreign tourists has significant negative impacts on the number of Japanese visitors in business and city hotels from 2014.

Table 4 shows the time-varying impacts of Japanese guests' demand on that of foreign guests (foreigner ← Japanese). Columns (3) and (4) show that the increase in Japanese guests has significant negative impacts on the number of foreign tourists in business and city hotels from 2013.

Ryokan and resort hotels does not show a structural change of trend in Tables 3 and 4. In Figure 2, room occupancy rates for ryokan and resort hotel do not reach the upper limit;

[11]The OLS estimation results are shown in Appendix A. First stage estimation results with time-varying parameters are not reported because of a large number of instrumental variables. Instead, Appendix B provides first stage estimation results with time-invariant parameters including overidentification tests. Appendix C further investigates the geographical distributions of hotel demand between Japanese and foreign guests.

thus, demand competition between the Japanese and foreign guests is not observed during the inbound tourism boom.

Importantly, demand competition between the foreign and Japanese visitors should be simultaneously detected as a negative sign in Tables 3 and 4. To clarify this timing, Figures 4 and 5 present the coefficient estimates for business and city hotels. For business hotel in Figure 4, the coefficient estimates become significantly negative from 2014 in Panel (a) and from 2013 in Panel (b). Similarly, for City Hotel in Figure 5, the coefficient estimates become significantly negative from 2014 in Panel (a) and from 2013 in Panel (b). These estimation results show that the timing of negative coefficient estimates is almost the same, suggesting that the inbound tourism boom was a trigger of demand competition between the Japanese and foreign visitors in business and city hotels.

[Tables 3–4 and Figures 4–5]

4.2 Heterogeneity in City Size

Tables 5 and 6 present the IV estimation results of demand competition between the Japanese and foreign guests with the time-varying coefficient estimates decomposed by city size. The estimation results show that the city size increases the degree of demand competition, which is remarkable in business and city hotels.

Figures 6 illustrates the heterogeneity in demand competition in business hotel in terms of city size. Panels (a) and (b) for large cities show a sharp structural change in the trend from 2014 and from 2013, respectively.

Figures 7 presents the case of city hotel and almost the same results as business hotel for large cities in Panels (a) and (b). Because large cities attract foreign and Japanese visitors, room occupancy rates have remained high in the late 2010s.

In addition, Panels (c) and (d) of Figures 6 and 7 illustrate the heterogeneity in demand competition for small cities in business and city hotels, respectively. Panels (a) and (b) of Figures 6 show a structural change in the trends from 2016 and from 2015, respectively, in business hotel. However, this observation is unclear for city hotel in Panels (c) and (d) of Figure 7. Notably, demand competition is observed only for business hotels located in small cities a few years behind the large cities.

To sum up, the inbound tourism boom resulted in demand competition in business and

city hotels located in large cities. For business hotel, demand competition was also observed in small cities, but its timing was earlier in larger cities. These findings offers evidence that the demand competition was tougher in larger cities.

[Table 5–6 and Figures 6–7]

5 Conclusion

This study has uncovered tougher demand competition in larger cities in the accommodation sector. Starting in 2012, the sudden rise of international tourists increases the room occupancy rates of hotels, especially in large cities, such as Tokyo and Osaka. Large cities also attracts domestic visitors from across Japan for sightseeing and business travel, which results in a hypothesis of tougher demand competition between Japanese and foreign visitors in larger cities.

After controlling for regional fixed effects as a first nature and seasonal trends by year-on-year difference, this study finds that the increase in hotel demand of foreign visitors has taken vacant rooms from Japanese tourists (vice versa) in business and city hotels since the period 2012–2013. Furthermore, this demand competition is tougher in larger cities. Importantly, excess demand under fixed supply capacity is a trigger for demand competition, which results in costs of waiting or searching for consumers, and these costs are not always observed.

This finding leads to critical implication for the promotion of demand dispersion to reduce costs from demand competition. Whereas service suppliers benefit from a demand boom, consumers incur non-pecuniary costs of waiting or searching under fixed supply capacity. This situation is not limited to the accommodation sector. For example, high congestion in a peak time of commuting and a long line of consumers in stores and restaurants are typical cases in large cities. Thus, urban policymakers should reduce these costs and increase consumer's satisfaction with urban agglomeration.

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Appendix A OLS Estimation Results for Demand Competition

The OLS Estimation results of regression (2) by year are presented in Tables A.1 and A.2. The OLS Estimation results of regression (2) by year and city size are presented in Tables A.3 and A.4.

[Tables A.1–A.4]

Appendix B IV Estimation Results with Time-Invariant Parameters

Tables B.1 and B.2 present the OLS and IV estimation results of demand competition between Japanese and foreign guests by accommodation type including first stage estimation results. Notably, parameters of demand competition are time-invariant in this specification to simplify the report of first estimation results. The overidentification result is almost the same as time-variant parameters in Tables 3 and 4

[Tables B.1–B.2]

Appendix C Hotel Demand Growth and Urban Agglomeration

C.1 Reduced Form Regression

After some manipulations of equations (1) with time-invariant parameters π_1^{J} and π_1^{F} (index of year y is dropped), the reduced form of hotel demands can be expressed as follows:

$$\begin{aligned}\log(\mathrm{Guest}_{iym}^{\mathrm{type}}) = {} & \alpha^{\mathrm{type}} \log\left(\mathrm{City}_{iy}\right) + \beta_1^{\mathrm{type}} \log(\mathrm{Capacity}_{iy}) + \beta_2^{\mathrm{type}} \log(\mathrm{Emp}_{iy}) \\ & + \eta_i^{\prime,\mathrm{type}} + \kappa_a^{\prime,\mathrm{type}} + \psi_y^{\prime,\mathrm{type}} + \psi_m^{\prime,\mathrm{type}} + u_{it}^{\prime,\mathrm{type}}, \qquad \mathrm{type} \in (\mathrm{J},\mathrm{F}),\end{aligned} \tag{3}$$

where the parameters are expressed with prime. To remove hotel, area, and monthly fixed effects ($\eta_i^{\prime,\mathrm{type}}$, $\kappa_a^{\prime,\mathrm{type}}$, and $\psi_m^{\prime,\mathrm{type}}$), the year-on-year difference is as follows:

$$\begin{aligned}\Delta_y \log(\mathrm{Guest}_{iym}^{\mathrm{type}}) = {} & \alpha_1^{\mathrm{type}} \Delta_y \log\left(\mathrm{City}_{iy}\right) + \beta_1^{\mathrm{type}} \Delta_y \log(\mathrm{Capacity}_{iy}) + \beta_2^{\mathrm{type}} \Delta_y \log(\mathrm{Emp}_{iy}) \\ & + \psi_y^{\prime} + e_{iaym}\end{aligned} \tag{4}$$

Notably, this specification does not account for scale effect of urban agglomeration because taking a temporal difference annihilates scale information. To additionally consider scale effect

of urban agglomeration, the one-year lag of the urban agglomeration variable is introduced as follows:

$$\begin{aligned}\Delta_y \log(\text{Guest}_{iym}^{\text{type}}) = \gamma_1 \Delta_y \log\left(\text{City}_{iy}\right) + \theta \log\left(\text{City}_{i,y-1}\right) \\ + \delta_1 \Delta_y \log(\text{Capacity}_{iy}) + \delta_2 \Delta_y \log(\text{Emp}_{iy}) + \psi'_y + e_{it}\end{aligned} \tag{5}$$

where, if $\theta \neq 0$, the scale of urban agglomeration affects hotel demand dynamics.

Estimation of the reduced form captures how urban agglomeration affects the hotel demand of Japanese and foreign visitors differently by comparing coefficient estimates of urban agglomeration variables. Notably, the parameters in equation (5) comprise of those of the structural equations.

C.2 Estimation Results

Table C.1 presents estimation results for the regression analysis of hotel demand level by accommodation type. A notable finding is that the coefficient estimates of urban agglomeration for foreign guests are much larger than those for Japanese guests; thus, the demand of foreign guests is more concentrated in larger cities.

Table C.2 presents estimation results for the regression analysis of hotel demand growth by accommodation type, which captures the dynamic and scale effects of urban agglomeration. The coefficient of the one-year lag of urban agglomeration captures the scale effect of agglomeration. In Columns (6) and (8), for business hotel and city hotel, demand growth in larger cities is higher.

A notable feature in Table C.2 is the coefficient estimates of the growth rate of urban agglomeration. Hotel demand growth of Japanese guests is higher in growing cities. Hotel demand growth of foreign guests is higher in shrinking cities, suggesting that demand of foreign guests relocates from urban to rural areas.

[Tables C.1–C.2]

Table 1 Descriptive Statistics for Regression of Hotel Demand

	Japanese Guests			Foreign Guests		
Variables	Obs.	Mean	S.D.	Obs.	Mean	S.D.
	Ryokan					
Log(Number of Guest Nights per Month)	452,352	5.984	1.658	158,016	3.017	1.832
Log(Urban Agglomeration)	452,352	9.605	1.670	158,016	9.813	1.735
Log(Hotel Capacity)	452,352	4.318	0.984	158,016	4.809	0.985
Log(Employment)	452,352	2.801	1.154	158,016	3.401	1.024
	Resort Hotel					
Log(Number of Guest Nights per Month)	108,441	7.200	1.542	59,344	4.139	2.252
Log(Urban Agglomeration)	108,441	9.553	1.737	59,344	9.824	1.831
Log(Hotel Capacity)	108,441	5.111	1.079	59,344	5.466	1.048
Log(Employment)	108,441	3.689	1.136	59,344	4.066	1.078
	Business Hotel					
Log(Number of Guest Nights per Month)	329,060	7.479	1.050	242,402	3.874	2.002
Log(Urban Agglomeration)	329,060	12.142	1.674	242,402	12.461	1.615
Log(Hotel Capacity)	329,060	4.782	0.756	242,402	4.965	0.680
Log(Employment)	329,060	2.971	0.733	242,402	3.091	0.681
	City Hotel					
Log(Number of Guest Nights per Month)	82,405	7.932	1.060	73,524	5.317	2.347
Log(Urban Agglomeration)	82,405	12.581	1.612	73,524	12.699	1.573
Log(Hotel Capacity)	82,405	5.329	0.910	73,524	5.440	0.870
Log(Employment)	82,405	4.519	1.005	73,524	4.622	0.970

Note: Dataset covers the period between January 2007 and December 2017.

Table 2 Descriptive Statistics for Regression of Hotel Demand Growth

	Japanese Guests			Foreign Guests		
Variables	Obs.	Mean	S.D.	Obs.	Mean	S.D.
	Ryokan					
Growth Rate of Number of Guest Nights per Month	286,033	−0.023	0.341	85,929	0.174	1.083
Growth Rate in Urban Agglomeration	286,033	−0.001	0.011	85,929	−0.001	0.010
One year lag of Log(Urban Agglomeration)	286,033	9.710	1.640	85,929	9.945	1.730
Growth Rate of Hotel Capacity	286,033	−0.004	0.097	85,929	−0.003	0.085
Growth Rate of Employment	286,033	−0.014	0.142	85,929	−0.007	0.125
	Resort Hotel					
Growth Rate of Number of Guest Nights per Month	80,241	−0.006	0.294	37,675	0.111	1.081
Growth Rate in Urban Agglomeration	80,241	−0.001	0.010	37,675	−0.001	0.010
One year lag of Log(Urban Agglomeration)	80,241	9.638	1.746	37,675	9.999	1.857
Growth Rate of Hotel Capacity	80,241	0.001	0.105	37,675	0.003	0.100
Growth Rate of Employment	80,241	−0.006	0.179	37,675	−0.002	0.171
	Business Hotel					
Growth Rate of Number of Guest Nights per Month	246,606	0.004	0.235	166,852	0.108	1.063
Growth Rate in Urban Agglomeration	246,606	−0.001	0.011	166,852	−0.001	0.011
One year lag of Log(Urban Agglomeration)	246,606	12.213	1.638	166,852	12.606	1.572
Growth Rate of Hotel Capacity	246,606	0.003	0.085	166,852	0.005	0.081
Growth Rate of Employment	246,606	−0.004	0.142	166,852	−0.001	0.139
	City Hotel					
Growth Rate of Number of Guest Nights per Month	70,596	−0.003	0.211	60,398	0.081	0.912
Growth Rate in Urban Agglomeration	70,596	−0.001	0.011	60,398	−0.001	0.011
One year lag of Log(Urban Agglomeration)	70,596	12.601	1.588	60,398	12.773	1.537
Growth Rate of Hotel Capacity	70,596	0.004	0.062	60,398	0.003	0.060
Growth Rate of Employment	70,596	−0.005	0.155	60,398	−0.004	0.155

Note: Dataset covers the period between January 2007 and December 2017. Growth rate variables are calculated on a year-on-year basis.

Table 3 IV Estimation Results for Hotel Demand Growth (Japanese ← Foreigner) by Year

	Dependent Variable: Δ log(Number of Guest Nights per Month of Japanese)			
	Ryokan	Resort Hotel	Business Hotel	City Hotel
Variables	(1)	(2)	(3)	(4)
Δ log(Number of Guest Nights of Foreigners) × 2009	−0.018	0.008	0.029***	0.030*
	(0.013)	(0.017)	(0.010)	(0.018)
Δ log(Number of Guest Nights of Foreigners) × 2010	0.001	−0.006	0.025***	−0.019
	(0.017)	(0.019)	(0.008)	(0.016)
Δ log(Number of Guest Nights of Foreigners) × 2011	−0.055***	−0.007	0.008	−0.002
	(0.018)	(0.023)	(0.007)	(0.013)
Δ log(Number of Guest Nights of Foreigners) × 2012	−0.120***	−0.116***	0.001	−0.003
	(0.023)	(0.029)	(0.007)	(0.014)
Δ log(Number of Guest Nights of Foreigners) × 2013	0.017	−0.026	−0.002	0.014
	(0.021)	(0.024)	(0.007)	(0.015)
Δ log(Number of Guest Nights of Foreigners) × 2014	−0.024	−0.001	−0.022***	−0.029**
	(0.019)	(0.023)	(0.007)	(0.014)
Δ log(Number of Guest Nights of Foreigners) × 2015	−0.003	0.000	−0.021***	−0.037**
	(0.016)	(0.021)	(0.007)	(0.015)
Δ log(Number of Guest Nights of Foreigners) × 2016	−0.007	0.005	−0.026***	−0.026*
	(0.015)	(0.023)	(0.006)	(0.016)
Δ log(Number of Guest Nights of Foreigners) × 2017	−0.001	−0.007	−0.027***	−0.021
	(0.017)	(0.018)	(0.007)	(0.016)
Δ log(Urban Agglomeration)	0.236*	0.181	0.239***	0.429***
	(0.133)	(0.162)	(0.049)	(0.081)
L.log(Urban Agglomeration)	0.002	0.001	0.000	−0.002
	(0.001)	(0.002)	(0.001)	(0.002)
Δ log(Capacity)	0.141***	0.085**	0.052**	0.056
	(0.041)	(0.038)	(0.024)	(0.037)
Δ log(Employment)	0.048*	0.022	0.015*	0.001
	(0.026)	(0.016)	(0.008)	(0.010)
Number of Observations	48,438	23,551	119,440	46,124
Number of Hotels	2,287	898	3,492	938

Note: Heteroskedasticity-consistent standard errors clustered by hotels are in parentheses. * denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level. Year, month, and prefecture dummies are included. Δ and L. indicate year-on-year difference and one-year lag, respectively. Instruments for the logarithm of number of guest nights of foreigners are these one- and two-month lagged variables. Estimation results of the first-stage regression are not reported.

Table 4 IV Estimation Results for Hotel Demand Growth (Foreigner ← Japanese) by Year

	Dependent Variable: Δ log(Number of Guest Nights per Month of Foreigners)			
	Ryokan	Resort Hotel	Business Hotel	City Hotel
Variables	(1)	(2)	(3)	(4)
Δ log(Number of Guest Nights of Japanese) × 2009	−0.255	−0.096	0.196	−0.006
	(0.297)	(0.455)	(0.215)	(0.304)
Δ log(Number of Guest Nights of Japanese) × 2010	0.212	−0.919**	0.027	−0.186
	(0.214)	(0.428)	(0.199)	(0.251)
Δ log(Number of Guest Nights of Japanese) × 2011	0.712***	0.463*	−0.080	0.264
	(0.181)	(0.259)	(0.176)	(0.257)
Δ log(Number of Guest Nights of Japanese) × 2012	0.879***	1.096***	0.036	0.253
	(0.247)	(0.363)	(0.213)	(0.271)
Δ log(Number of Guest Nights of Japanese) × 2013	−0.019	−0.976**	−0.602***	−0.638**
	(0.226)	(0.394)	(0.208)	(0.295)
Δ log(Number of Guest Nights of Japanese) × 2014	0.045	−0.232	−0.885***	−0.898***
	(0.239)	(0.418)	(0.212)	(0.262)
Δ log(Number of Guest Nights of Japanese) × 2015	−0.009	−0.313	−1.449***	−1.163***
	(0.167)	(0.317)	(0.222)	(0.280)
Δ log(Number of Guest Nights of Japanese) × 2016	0.121	0.002	−1.519***	−0.630**
	(0.152)	(0.310)	(0.216)	(0.278)
Δ log(Number of Guest Nights of Japanese) × 2017	−0.002	−0.472*	−1.162***	−0.511**
	(0.162)	(0.265)	(0.215)	(0.259)
Δ log(Urban Agglomeration)	−2.921***	−2.290***	−0.771***	−1.183***
	(0.407)	(0.664)	(0.259)	(0.384)
L.log(Urban Agglomeration)	−0.011***	0.003	0.025***	0.024***
	(0.004)	(0.005)	(0.004)	(0.006)
Δ log(Capacity)	0.132	0.096	0.091	0.063
	(0.086)	(0.132)	(0.062)	(0.090)
Δ log(Employment)	0.124**	0.023	−0.037	0.072*
	(0.049)	(0.063)	(0.036)	(0.042)
Number of Observations	64,042	27,584	129,425	44,507
Number of Hotels	3,097	1,075	3,641	923

Note: Heteroskedasticity-consistent standard errors clustered by hotels are in parentheses. * denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level. Year, month, and prefecture dummies are included. Δ and L. indicate year-on-year difference and one-year lag, respectively. Instruments for the logarithm of number of guest nights of foreigners are these one-, two-, and three-month lagged variables. Estimation results of the first-stage regression are not reported.

Table 5 IV Estimation Results for Hotel Demand Growth (Japanese ← Foreigner) by Year and City Size

	Dependent Variable: Δ log(Number of Guest Nights per Month of Foreigners)							
	Ryokan		Resort Hotel		Business Hotel		City Hotel	
	Large Cities	Small Cities	Large Cities	Small Cities	Large Cities	Small Cities	Large Cities	Small Cities
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ log(Number of Guest Nights of Foreigners) × 2009	−0.104*	−0.013	0.055	0.003	0.020*	0.051**	0.009	0.095***
	(0.056)	(0.014)	(0.035)	(0.019)	(0.011)	(0.020)	(0.020)	(0.033)
Δ log(Number of Guest Nights of Foreigners) × 2010	0.054	0.002	0.051	−0.025	0.022**	0.034**	−0.009	−0.055**
	(0.058)	(0.017)	(0.035)	(0.022)	(0.009)	(0.014)	(0.018)	(0.028)
Δ log(Number of Guest Nights of Foreigners) × 2011	−0.178**	−0.036**	0.029	−0.027	0.018**	−0.023*	−0.018	0.033
	(0.081)	(0.018)	(0.042)	(0.029)	(0.008)	(0.013)	(0.014)	(0.025)
Δ log(Number of Guest Nights of Foreigners) × 2012	0.046	−0.136***	−0.118*	−0.116***	−0.002	0.007	0.002	−0.007
	(0.088)	(0.024)	(0.063)	(0.033)	(0.009)	(0.012)	(0.017)	(0.028)
Δ log(Number of Guest Nights of Foreigners) × 2013	0.044	0.010	−0.060*	−0.019	0.002	−0.011	0.000	0.064**
	(0.087)	(0.020)	(0.033)	(0.028)	(0.009)	(0.012)	(0.017)	(0.032)
Δ log(Number of Guest Nights of Foreigners) × 2014	−0.048	−0.018	0.032	−0.011	−0.020**	−0.026*	−0.037**	−0.012
	(0.061)	(0.020)	(0.050)	(0.026)	(0.009)	(0.013)	(0.018)	(0.022)
Δ log(Number of Guest Nights of Foreigners) × 2015	0.050	−0.008	0.033	−0.005	−0.025***	−0.013	−0.039**	−0.028
	(0.068)	(0.016)	(0.038)	(0.023)	(0.009)	(0.011)	(0.017)	(0.031)
Δ log(Number of Guest Nights of Foreigners) × 2016	−0.064	−0.001	−0.033	0.011	−0.027***	−0.023**	−0.059***	0.033
	(0.062)	(0.015)	(0.039)	(0.026)	(0.009)	(0.009)	(0.019)	(0.026)
Δ log(Number of Guest Nights of Foreigners) × 2017	−0.019	−0.002	0.033	−0.014	−0.032***	−0.021**	−0.045**	0.017
	(0.060)	(0.019)	(0.037)	(0.020)	(0.010)	(0.010)	(0.020)	(0.026)
Δ log(Urban Agglomeration)	0.417	0.166	−0.437*	0.348*	0.207***	0.301***	0.279***	0.699***
	(0.495)	(0.136)	(0.254)	(0.190)	(0.059)	(0.091)	(0.091)	(0.179)
L.log(Urban Agglomeration)	0.034	0.002	0.008	0.002	−0.003	0.004*	−0.005	−0.001
	(0.026)	(0.002)	(0.017)	(0.002)	(0.002)	(0.002)	(0.004)	(0.004)
Δ log(Capacity)	0.190**	0.136***	0.086	0.087**	0.063*	0.044*	0.045	0.104
	(0.076)	(0.046)	(0.102)	(0.040)	(0.035)	(0.027)	(0.042)	(0.064)
Δ log(Employment)	0.054	0.041	0.003	0.027	0.009	0.034**	0.003	−0.003
	(0.071)	(0.027)	(0.020)	(0.021)	(0.010)	(0.015)	(0.013)	(0.016)
Number of Observations	5,571	42,867	4,072	19,479	80,084	39,356	33,148	12,976
Number of Hotels	246	2,069	109	806	2,134	1,490	648	338

Note: Heteroskedasticity-consistent standard errors clustered by hotels are in parentheses. * denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level. Year, month, and prefecture dummies are included. Δ and L. indicate year-on-year difference and one-year lag, respectively. Instruments for the logarithm of number of guest nights of foreigners are these one- and two-month lagged variables. Estimation results of the first-stage regression are not reported.

Table 6 IV Estimation Results for Hotel Demand Growth (Foreigner ← Japanese) by Year and City Size

	Dependent Variable: Δ log(Number of Guest Nights per Month of Foreigners)							
	Ryokan		Resort Hotel		Business Hotel		City Hotel	
	Large Cities	Small Cities	Large Cities	Small Cities	Large Cities	Small Cities	Large Cities	Small Cities
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ log(Number of Guest Nights of Japanese) × 2009	1.844*	−0.542*	1.572	−0.398	0.020	0.558	0.379	−0.828
	(0.993)	(0.317)	(2.041)	(0.469)	(0.271)	(0.354)	(0.340)	(0.596)
Δ log(Number of Guest Nights of Japanese) × 2010	0.407	0.221	0.826	−1.325***	0.058	−0.042	−0.305	0.118
	(0.923)	(0.217)	(0.899)	(0.482)	(0.234)	(0.374)	(0.291)	(0.471)
Δ log(Number of Guest Nights of Japanese) × 2011	−0.162	0.865***	0.837***	0.259	−0.049	−0.226	0.056	0.657
	(0.471)	(0.192)	(0.299)	(0.339)	(0.214)	(0.318)	(0.298)	(0.476)
Δ log(Number of Guest Nights of Japanese) × 2012	−0.950	0.918***	1.543***	0.910**	0.292	−0.461	0.595**	−0.616
	(0.843)	(0.248)	(0.520)	(0.463)	(0.254)	(0.374)	(0.298)	(0.600)
Δ log(Number of Guest Nights of Japanese) × 2013	−1.149	0.085	−3.682**	−0.766*	−0.806***	−0.174	−0.909**	−0.083
	(0.827)	(0.234)	(1.846)	(0.400)	(0.253)	(0.361)	(0.351)	(0.581)
Δ log(Number of Guest Nights of Japanese) × 2014	0.006	0.080	−0.776	−0.091	−1.173***	−0.326	−0.822***	−0.825
	(0.659)	(0.258)	(1.210)	(0.413)	(0.257)	(0.353)	(0.283)	(0.580)
Δ log(Number of Guest Nights of Japanese) × 2015	−0.386	0.066	−1.692	−0.143	−1.290***	−1.674***	−1.063***	−1.389**
	(0.372)	(0.184)	(1.147)	(0.335)	(0.258)	(0.431)	(0.316)	(0.590)
Δ log(Number of Guest Nights of Japanese) × 2016	−0.299	0.156	0.076	0.009	−1.379***	−1.936***	−1.181***	0.507
	(0.390)	(0.164)	(0.678)	(0.338)	(0.252)	(0.413)	(0.317)	(0.581)
Δ log(Number of Guest Nights of Japanese) × 2017	−0.577	0.015	−0.436	−0.480*	−1.510***	−0.732**	−0.978***	0.346
	(1.046)	(0.161)	(0.879)	(0.275)	(0.283)	(0.338)	(0.326)	(0.448)
Δ log(Urban Agglomeration)	−2.952**	−3.003***	−5.467***	−1.842**	−0.474	−1.317***	−1.680***	−0.595
	(1.338)	(0.424)	(1.669)	(0.765)	(0.313)	(0.465)	(0.414)	(0.822)
L.log(Urban Agglomeration)	−0.070	−0.007*	0.048	−0.002	0.021**	0.029***	0.018	0.033**
	(0.046)	(0.004)	(0.058)	(0.006)	(0.008)	(0.009)	(0.012)	(0.014)
Δ log(Capacity)	0.101	0.146	0.020	0.107	0.139*	0.023	0.035	0.168
	(0.232)	(0.093)	(0.449)	(0.140)	(0.084)	(0.091)	(0.101)	(0.196)
Δ log(Employment)	−0.073	0.130**	0.214***	−0.071	−0.066	0.030	0.017	0.149
	(0.165)	(0.051)	(0.076)	(0.065)	(0.042)	(0.067)	(0.048)	(0.106)
Number of Observations	6,181	57,861	4,177	23,407	81,452	47,973	30,430	14,077
Number of Hotels	270	2,863	112	979	2,097	1,684	625	346

Note: Heteroskedasticity-consistent standard errors clustered by hotels are in parentheses. * denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level. Year, month, and prefecture dummies are included. Δ and L. indicate year-on-year difference and one-year lag, respectively. Instruments for the logarithm of number of guest nights of foreigners are these one-, two-, and three-month lagged variables. Estimation results of the first-stage regression are not reported.

Table A.1 OLS Estimation Results for Hotel Demand Growth (Japanese ← Foreigner) by Year

	Dependent Variable: Δ log(Number of Guest Nights per Month of Japanese)			
	Ryokan	Resort Hotel	Business Hotel	City Hotel
Variables	(1)	(2)	(3)	(4)
Δ log(Number of Guest Nights of Foreigners) × 2008	−0.003	−0.005	−0.004*	−0.011***
	(0.003)	(0.005)	(0.002)	(0.004)
Δ log(Number of Guest Nights of Foreigners) × 2009	−0.008**	0.002	0.006**	0.005
	(0.003)	(0.004)	(0.003)	(0.004)
Δ log(Number of Guest Nights of Foreigners) × 2010	−0.005	−0.011***	0.004	−0.012***
	(0.003)	(0.004)	(0.002)	(0.004)
Δ log(Number of Guest Nights of Foreigners) × 2011	0.022***	0.028***	0.006***	0.010**
	(0.004)	(0.006)	(0.002)	(0.004)
Δ log(Number of Guest Nights of Foreigners) × 2012	0.017***	0.032***	0.007***	0.014***
	(0.004)	(0.006)	(0.002)	(0.004)
Δ log(Number of Guest Nights of Foreigners) × 2013	0.002	−0.008	−0.007***	−0.010**
	(0.003)	(0.005)	(0.002)	(0.004)
Δ log(Number of Guest Nights of Foreigners) × 2014	−0.008**	−0.001	−0.008***	−0.018***
	(0.003)	(0.006)	(0.002)	(0.005)
Δ log(Number of Guest Nights of Foreigners) × 2015	−0.005	−0.007	−0.014***	−0.029***
	(0.003)	(0.006)	(0.002)	(0.005)
Δ log(Number of Guest Nights of Foreigners) × 2016	−0.003	−0.004	−0.019***	−0.022***
	(0.003)	(0.006)	(0.002)	(0.005)
Δ log(Number of Guest Nights of Foreigners) × 2017	−0.003	−0.008	−0.016***	−0.015***
	(0.003)	(0.006)	(0.002)	(0.005)
Δ log(Urban Agglomeration)	0.055	0.096	0.320***	0.311***
	(0.078)	(0.121)	(0.042)	(0.072)
L.log(Urban Agglomeration)	0.002**	0.002	0.000	−0.002
	(0.001)	(0.001)	(0.001)	(0.001)
Δ log(Capacity)	0.095***	0.086***	0.048**	0.078*
	(0.028)	(0.032)	(0.019)	(0.040)
Δ log(Employment)	0.050***	0.024*	0.021***	0.004
	(0.016)	(0.013)	(0.008)	(0.011)
Number of Observations	85,089	37,311	166,294	60,184
Number of Hotels	3,750	1,236	4,117	1,021
Adjusted R-Squared	0.013	0.018	0.043	0.029

Note: Heteroskedasticity-consistent standard errors clustered by hotels are in parentheses. * denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level. Year, month, and prefecture dummies are included. Δ and L. indicate year-on-year difference and one-year lag, respectively.

Table A.2 OLS Estimation Results for Hotel Demand Growth (Foreigner ← Japanese) by Year

	Dependent Variable: Δ log(Number of Guest Nights per Month of Foreigners)			
	Ryokan	Resort Hotel	Business Hotel	City Hotel
Variables	(1)	(2)	(3)	(4)
Δ log(Number of Guest Nights of Japanese) × 2008	−0.059	−0.123	−0.133*	−0.280***
	(0.065)	(0.102)	(0.069)	(0.091)
Δ log(Number of Guest Nights of Japanese) × 2009	−0.173***	0.042	0.140**	0.098
	(0.066)	(0.094)	(0.062)	(0.080)
Δ log(Number of Guest Nights of Japanese) × 2010	−0.115	−0.219**	0.115*	−0.242***
	(0.071)	(0.100)	(0.067)	(0.084)
Δ log(Number of Guest Nights of Japanese) × 2011	0.299***	0.362***	0.148***	0.197**
	(0.055)	(0.080)	(0.057)	(0.082)
Δ log(Number of Guest Nights of Japanese) × 2012	0.291***	0.483***	0.187***	0.318***
	(0.060)	(0.091)	(0.058)	(0.086)
Δ log(Number of Guest Nights of Japanese) × 2013	0.024	−0.181*	−0.233***	−0.270**
	(0.060)	(0.104)	(0.066)	(0.116)
Δ log(Number of Guest Nights of Japanese) × 2014	−0.140**	−0.010	−0.271***	−0.346***
	(0.055)	(0.096)	(0.066)	(0.098)
Δ log(Number of Guest Nights of Japanese) × 2015	−0.073	−0.119	−0.439***	−0.503***
	(0.050)	(0.088)	(0.072)	(0.089)
Δ log(Number of Guest Nights of Japanese) × 2016	−0.039	−0.064	−0.484***	−0.341***
	(0.040)	(0.080)	(0.055)	(0.076)
Δ log(Number of Guest Nights of Japanese) × 2017	−0.030	−0.097	−0.395***	−0.228***
	(0.043)	(0.081)	(0.059)	(0.076)
Δ log(Urban Agglomeration)	−1.805***	−1.216**	−0.670***	−0.663**
	(0.349)	(0.550)	(0.220)	(0.324)
L.log(Urban Agglomeration)	−0.010***	−0.001	0.028***	0.026***
	(0.003)	(0.005)	(0.004)	(0.005)
Δ log(Capacity)	0.114	0.084	0.017	0.183**
	(0.071)	(0.106)	(0.049)	(0.090)
Δ log(Employment)	0.138***	0.030	−0.038	0.072*
	(0.037)	(0.048)	(0.030)	(0.039)
Number of Observations	85,089	37,311	166,294	60,184
Number of Hotels	3,750	1,236	4,117	1,021
Adjusted R-Squared	0.067	0.091	0.047	0.082

Note: Heteroskedasticity-consistent standard errors clustered by hotels are in parentheses. * denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level. Year, month, and prefecture dummies are included. Δ and L. indicate year-on-year difference and one-year lag, respectively.

Table A.3 OLS Estimation Results for Hotel Demand Growth (Japanese ← Foreigner) by Year and City Size

	Dependent Variable: Δ log(Number of Guest Nights per Month of Foreigners)							
	Ryokan		Resort Hotel		Business Hotel		City Hotel	
	Large Cities	Small Cities	Large Cities	Small Cities	Large Cities	Small Cities	Large Cities	Small Cities
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ log(Number of Guest Nights of Foreigners) × 2008	0.001	−0.003	−0.010	−0.005	−0.007***	−0.002	−0.021***	−0.001
	(0.009)	(0.003)	(0.009)	(0.005)	(0.003)	(0.004)	(0.005)	(0.006)
Δ log(Number of Guest Nights of Foreigners) × 2009	−0.021*	−0.007**	0.015	0.000	0.001	0.015***	0.003	0.007
	(0.011)	(0.003)	(0.010)	(0.005)	(0.003)	(0.004)	(0.005)	(0.006)
Δ log(Number of Guest Nights of Foreigners) × 2010	0.001	−0.004	0.004	−0.014***	0.003	0.005	−0.013***	−0.011**
	(0.011)	(0.003)	(0.012)	(0.004)	(0.003)	(0.004)	(0.005)	(0.006)
Δ log(Number of Guest Nights of Foreigners) × 2011	−0.002	0.025***	0.029	0.028***	0.009***	0.001	0.007	0.013*
	(0.014)	(0.004)	(0.019)	(0.006)	(0.003)	(0.003)	(0.005)	(0.007)
Δ log(Number of Guest Nights of Foreigners) × 2012	0.018	0.017***	0.085***	0.024***	0.009***	0.002	0.022***	0.004
	(0.014)	(0.004)	(0.017)	(0.006)	(0.003)	(0.003)	(0.006)	(0.006)
Δ log(Number of Guest Nights of Foreigners) × 2013	−0.008	0.003	−0.009	−0.008	−0.008***	−0.005*	−0.013**	−0.006
	(0.013)	(0.003)	(0.009)	(0.006)	(0.003)	(0.003)	(0.007)	(0.006)
Δ log(Number of Guest Nights of Foreigners) × 2014	−0.024*	−0.006*	0.008	−0.004	−0.012***	−0.004	−0.023***	−0.010*
	(0.012)	(0.003)	(0.023)	(0.006)	(0.003)	(0.003)	(0.008)	(0.005)
Δ log(Number of Guest Nights of Foreigners) × 2015	−0.011	−0.004	−0.024**	−0.006	−0.018***	−0.009***	−0.039***	−0.013**
	(0.011)	(0.003)	(0.012)	(0.006)	(0.003)	(0.003)	(0.007)	(0.005)
Δ log(Number of Guest Nights of Foreigners) × 2016	−0.016	−0.002	−0.040**	0.000	−0.025***	−0.013***	−0.042***	−0.002
	(0.014)	(0.003)	(0.018)	(0.007)	(0.003)	(0.003)	(0.008)	(0.006)
Δ log(Number of Guest Nights of Foreigners) × 2017	−0.010	−0.002	−0.007	−0.008	−0.023***	−0.011***	−0.032***	−0.001
	(0.012)	(0.003)	(0.016)	(0.006)	(0.004)	(0.002)	(0.007)	(0.006)
Δ log(Urban Agglomeration)	0.107	0.059	0.009	0.119	0.298***	0.331***	0.168**	0.600***
	(0.310)	(0.079)	(0.255)	(0.138)	(0.050)	(0.079)	(0.083)	(0.144)
L.log(Urban Agglomeration)	0.026	0.002**	0.008	0.002	0.001	0.001	−0.003	−0.004
	(0.018)	(0.001)	(0.014)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Δ log(Capacity)	0.152*	0.084***	0.051	0.092**	0.073**	0.026	0.062	0.119*
	(0.080)	(0.029)	(0.044)	(0.036)	(0.030)	(0.021)	(0.045)	(0.071)
Δ log(Employment)	0.082*	0.044***	0.004	0.033*	0.022**	0.022	0.003	0.007
	(0.048)	(0.016)	(0.017)	(0.017)	(0.009)	(0.014)	(0.010)	(0.025)
Number of Observations	9,046	76,043	5,449	31,862	105,899	60,395	42,104	18,080
Number of Hotels	341	3,447	122	1,134	2,369	1,904	688	385
Adjusted R-Squared	0.031	0.013	0.068	0.016	0.049	0.039	0.033	0.036

Note: Heteroskedasticity-consistent standard errors clustered by hotels are in parentheses. * denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level. Year, month, and prefecture dummies are included. Δ and L. iindicate year-on-year difference and one year lag, respectively.

Table A.4 OLS Estimation Results for Hotel Demand Growth (Foreigner ← Japanese) by Year and City Size

	Dependent Variable: Δ log(Number of Guest Nights per Month of Foreigners)							
	Ryokan		Resort Hotel		Business Hotel		City Hotel	
	Large Cities	Small Cities	Large Cities	Small Cities	Large Cities	Small Cities	Large Cities	Small Cities
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ log(Number of Guest Nights of Japanese) × 2008	0.019	−0.076	−0.404	−0.105	−0.209**	−0.066	−0.461***	−0.037
	(0.139)	(0.072)	(0.375)	(0.106)	(0.089)	(0.107)	(0.110)	(0.155)
Δ log(Number of Guest Nights of Japanese) × 2009	−0.338**	−0.150**	0.357	−0.002	0.008	0.343***	0.084	0.119
	(0.150)	(0.074)	(0.264)	(0.100)	(0.079)	(0.099)	(0.096)	(0.147)
Δ log(Number of Guest Nights of Japanese) × 2010	−0.073	−0.111	0.131	−0.271***	0.106	0.134	−0.237**	−0.237*
	(0.168)	(0.078)	(0.363)	(0.099)	(0.086)	(0.106)	(0.102)	(0.142)
Δ log(Number of Guest Nights of Japanese) × 2011	0.015	0.347***	0.310	0.366***	0.195***	0.034	0.144	0.273*
	(0.149)	(0.059)	(0.202)	(0.087)	(0.075)	(0.086)	(0.095)	(0.146)
Δ log(Number of Guest Nights of Japanese) × 2012	0.307	0.287***	1.050***	0.365***	0.268***	0.056	0.444***	0.125
	(0.201)	(0.063)	(0.178)	(0.099)	(0.078)	(0.082)	(0.108)	(0.138)
Δ log(Number of Guest Nights of Japanese) × 2013	−0.087	0.054	−0.433**	−0.159	−0.257***	−0.195**	−0.305**	−0.206
	(0.152)	(0.065)	(0.220)	(0.111)	(0.090)	(0.097)	(0.151)	(0.181)
Δ log(Number of Guest Nights of Japanese) × 2014	−0.234*	−0.113*	0.131	−0.034	−0.366***	−0.143	−0.383***	−0.234
	(0.120)	(0.062)	(0.395)	(0.096)	(0.092)	(0.093)	(0.123)	(0.149)
Δ log(Number of Guest Nights of Japanese) × 2015	−0.149	−0.056	−0.548**	−0.083	−0.502***	−0.316***	−0.560***	−0.311**
	(0.093)	(0.057)	(0.252)	(0.093)	(0.096)	(0.109)	(0.107)	(0.154)
Δ log(Number of Guest Nights of Japanese) × 2016	−0.092	−0.032	−0.475	−0.027	−0.527***	−0.456***	−0.484***	−0.090
	(0.088)	(0.044)	(0.313)	(0.083)	(0.070)	(0.088)	(0.086)	(0.141)
Δ log(Number of Guest Nights of Japanese) × 2017	−0.030	−0.035	0.020	−0.104	−0.440***	−0.349***	−0.356***	0.007
	(0.093)	(0.048)	(0.282)	(0.083)	(0.077)	(0.091)	(0.088)	(0.146)
Δ log(Urban Agglomeration)	−2.134**	−1.768***	−3.941***	−0.718	−0.249	−1.474***	−1.038***	−0.319
	(1.010)	(0.373)	(1.264)	(0.618)	(0.267)	(0.395)	(0.355)	(0.695)
L.log(Urban Agglomeration)	−0.063*	−0.006*	−0.002	−0.006	0.032***	0.025***	0.012	0.029**
	(0.033)	(0.004)	(0.058)	(0.006)	(0.008)	(0.008)	(0.010)	(0.013)
Δ log(Capacity)	0.240	0.109	0.134	0.077	0.045	−0.017	0.145	0.268*
	(0.197)	(0.076)	(0.180)	(0.120)	(0.063)	(0.072)	(0.103)	(0.151)
Δ log(Employment)	0.165	0.128***	0.136**	−0.025	−0.063*	0.028	0.010	0.169**
	(0.113)	(0.040)	(0.063)	(0.056)	(0.036)	(0.057)	(0.043)	(0.085)
Number of Observations	9,046	76,043	5,449	31,862	105,899	60,395	42,104	18,080
Number of Hotels	341	3,447	122	1,134	2,369	1,904	688	385
Adjusted R-Squared	0.089	0.066	0.144	0.086	0.065	0.027	0.109	0.047

Note: Heteroskedasticity-consistent standard errors clustered by hotels are in parentheses. * denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level. Year, month, and prefecture dummies are included. Δ and L. indicate year-on-year difference and one year lag, respectively.

Table B.1 Estimation Results for Hotel Demand Growth (Japanese ← Foreigner)

	Dependent Variable: Δ log(Number of Guest Nights per Month of Japanese)							
	Ryokan		Resort Hotel		Business Hotel		City Hotel	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ log(Number of Guest Nights of Foreigners)	0.001	−0.023***	0.002	−0.014*	−0.004***	−0.005*	−0.007***	−0.012**
	(0.001)	(0.006)	(0.002)	(0.008)	(0.001)	(0.003)	(0.002)	(0.006)
Δ log(Urban Agglomeration)	0.025	0.078	0.101	0.208	0.330***	0.255***	0.309***	0.370***
	(0.078)	(0.103)	(0.119)	(0.132)	(0.042)	(0.048)	(0.072)	(0.078)
L.log(Urban Agglomeration)	0.002**	0.002	0.002	0.001	0.000	−0.001	−0.002	−0.002
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
Δ log(Capacity)	0.095***	0.139***	0.085***	0.082**	0.048**	0.052**	0.078*	0.055
	(0.028)	(0.042)	(0.032)	(0.038)	(0.019)	(0.023)	(0.040)	(0.038)
Δ log(Employment)	0.051***	0.043*	0.024*	0.021	0.021***	0.016**	0.005	0.000
	(0.016)	(0.025)	(0.013)	(0.016)	(0.008)	(0.008)	(0.011)	(0.010)
Number of Observations	85,089	48,438	37,311	23,551	166,294	119,440	60,184	46,124
Number of Hotels	3,750	2,287	1,236	898	4,117	3,492	1,021	938
Adjusted R-Squared	0.012		0.015		0.041		0.026	
Instruments for First-Stage Regression								
One Month Lag of Δ log(Number of Foreign Guests)		0.210***		0.254***		0.302***		0.256***
		(0.007)		(0.010)		(0.005)		(0.009)
Two Month Lag of Δ log(Number of Foreign Guests)		0.124***		0.132***		0.120***		0.117***
		(0.006)		(0.008)		(0.004)		(0.007)
First-Stage *F*-Statistics		842.435		564.855		2671.144		659.473
Overidentification (*p*-value)		0.453		0.038		0.005		0.000

Note: Heteroskedasticity-consistent standard errors clustered by hotels are in parentheses. * denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level. Year, month, and prefecture dummies are included. Δ and L. indicate year-on-year difference and one-year lag, respectively.

Table B.2 Estimation Results for Hotel Demand Growth (Foreigner ← Japanese)

	Dependent Variable: Δ log(Number of Guest Nights per Month of Foreigners)							
	Ryokan		Resort Hotel		Business Hotel		City Hotel	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ log(Number of Guest Nights of Japanese)	0.010	0.220***	0.030	−0.079	−0.121***	−0.561***	−0.139***	−0.357***
	(0.020)	(0.074)	(0.034)	(0.128)	(0.024)	(0.081)	(0.034)	(0.110)
Δ log(Urban Agglomeration)	−1.832***	−2.960***	−1.249**	−2.308***	−0.660***	−0.793***	−0.711**	−1.242***
	(0.349)	(0.404)	(0.549)	(0.652)	(0.220)	(0.254)	(0.323)	(0.382)
L.log(Urban Agglomeration)	−0.010***	−0.011***	−0.001	0.003	0.029***	0.026***	0.026***	0.026***
	(0.003)	(0.004)	(0.005)	(0.005)	(0.004)	(0.004)	(0.005)	(0.006)
Δ log(Capacity)	0.111	0.114	0.077	0.070	0.015	0.078	0.192**	0.083
	(0.072)	(0.084)	(0.106)	(0.129)	(0.048)	(0.059)	(0.091)	(0.095)
Δ log(Employment)	0.142***	0.137***	0.031	0.018	−0.039	−0.041	0.068*	0.069*
	(0.038)	(0.049)	(0.047)	(0.060)	(0.030)	(0.036)	(0.039)	(0.041)
Number of Observations	85,089	64,042	37,311	27,584	166,294	129,425	60,184	44,507
Number of Hotels	3,750	3,097	1,236	1,075	4,117	3,641	1,021	923
Adjusted R-Squared	0.066		0.088		0.045		0.079	
Instruments for First-Stage Regression								
One Month Lag of Δ log(Number of Japanese Guests)		0.213***		0.188***		0.169***		0.183***
		(0.007)		(0.010)		(0.004)		(0.007)
Two Month Lag of Δ log(Number of Japanese Guests)		0.059***		0.060***		0.033***		0.052***
		(0.006)		(0.007)		(0.003)		(0.005)
Three Month Lag of Δ log(Number of Japanese Guests)		0.032***		0.023***		0.017***		0.021***
		(0.005)		(0.006)		(0.003)		(0.005)
First-Stage *F*-Statistics		394.561		164.340		607.643		252.579
Overidentification (*p*-value)		0.268		0.078		0.063		0.352

Note: Heteroskedasticity-consistent standard errors clustered by hotels are in parentheses. * denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level. Year, month, and prefecture dummies are included. Δ and L. indicate year-on-year difference and one-year lag, respectively.

Table C.1 OLS Estimation Results for Hotel Demand and Urban Agglomeration

	Dependent Variable: log(Number of Guest Nights per Month)							
	Ryokan		Resort Hotel		Business Hotel		City Hotel	
	Japanese Guests	Foreign Guests	Japanese Guests	Foreign Guests	Japanese Guests	Foreign Guests	Japanese Guests	Foreign Guests
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(Urban Agglomeration)	0.009*	0.078***	0.060***	0.173***	0.092***	0.188***	0.097***	0.126***
	(0.005)	(0.015)	(0.010)	(0.026)	(0.006)	(0.021)	(0.013)	(0.040)
log(Capacity)	0.829***	0.828***	0.859***	1.228***	1.058***	1.332***	0.951***	1.690***
	(0.014)	(0.038)	(0.023)	(0.052)	(0.010)	(0.033)	(0.022)	(0.055)
log(Employment)	0.569***	0.009	0.370***	0.088*	0.144***	0.099***	0.052***	0.041
	(0.011)	(0.032)	(0.021)	(0.050)	(0.009)	(0.029)	(0.018)	(0.042)
Number of Observations	452,352	158,016	108,441	59,344	329,060	242,402	82,405	73,524
Number of Hotels	14,229	7,786	2,419	1,869	6,497	5,611	1,237	1,162
Adjusted R-Squared	0.732	0.329	0.768	0.479	0.778	0.509	0.814	0.714

Note: Heteroskedasticity-consistent standard errors clustered by hotels are in parentheses. * denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level. Year, month, and prefecture dummies are included. Δ and L. indicate year-on-year difference and one-year lag, respectively.

Table C.2 OLS Estimation Results for Hotel Demand Growth and Urban Agglomeration

	Dependent Variable: Δ log(Number of Guest Nights per Month)							
	Ryokan		Resort Hotel		Business Hotel		City Hotel	
	Japanese Guests	Foreign Guests	Japanese Guests	Foreign Guests	Japanese Guests	Foreign Guests	Japanese Guests	Foreign Guests
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ log(Urban Agglomeration)	0.264***	−1.835***	0.187**	−1.203**	0.353***	−0.694***	0.362***	−0.728**
	(0.058)	(0.350)	(0.092)	(0.546)	(0.042)	(0.220)	(0.066)	(0.325)
L.log(Urban Agglomeration)	0.001*	−0.010***	0.001	0.000	0.002**	0.029***	0.000	0.026***
	(0.001)	(0.003)	(0.001)	(0.005)	(0.001)	(0.004)	(0.001)	(0.005)
Δ Log(Capacity)	0.051***	0.113	0.057*	0.094	0.037***	0.014	0.089**	0.184**
	(0.014)	(0.072)	(0.032)	(0.106)	(0.014)	(0.047)	(0.041)	(0.089)
Δ Log(Employment)	0.058***	0.139***	0.036***	0.042	0.014**	−0.041	0.014	0.069*
	(0.009)	(0.037)	(0.013)	(0.046)	(0.007)	(0.030)	(0.011)	(0.038)
Number of Observations	286,033	85,929	80,241	37,675	246,606	166,852	70,596	60,398
Number of Hotels	8,637	3,778	1,792	1,238	5,068	4,124	1,098	1,021
Adjusted R-Squared	0.009	0.066	0.015	0.088	0.033	0.044	0.023	0.078

Note: Heteroskedasticity-consistent standard errors clustered by hotels are in parentheses. * denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level. Year, month, and prefecture dummies are included. Δ and L. indicate year-on-year difference and one-year lag, respectively.

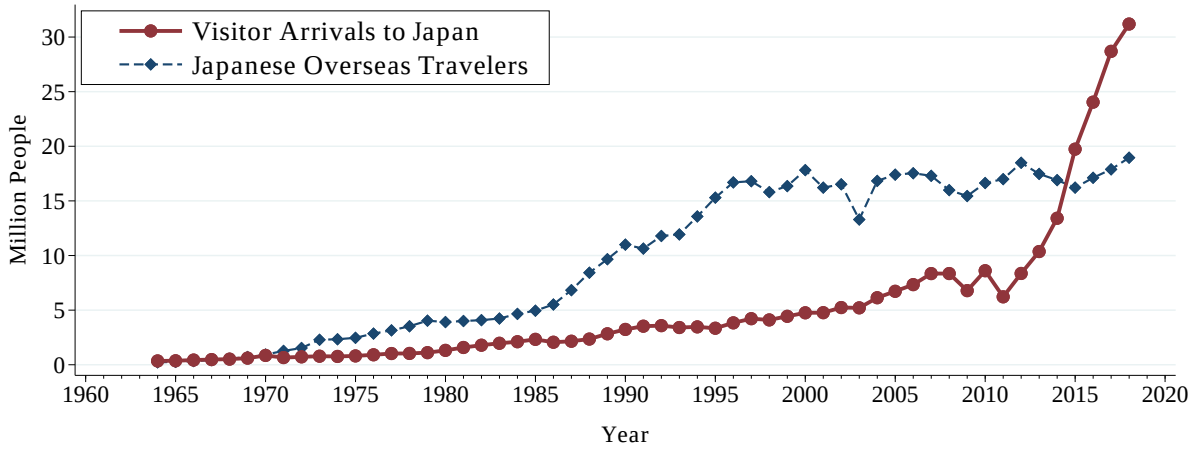
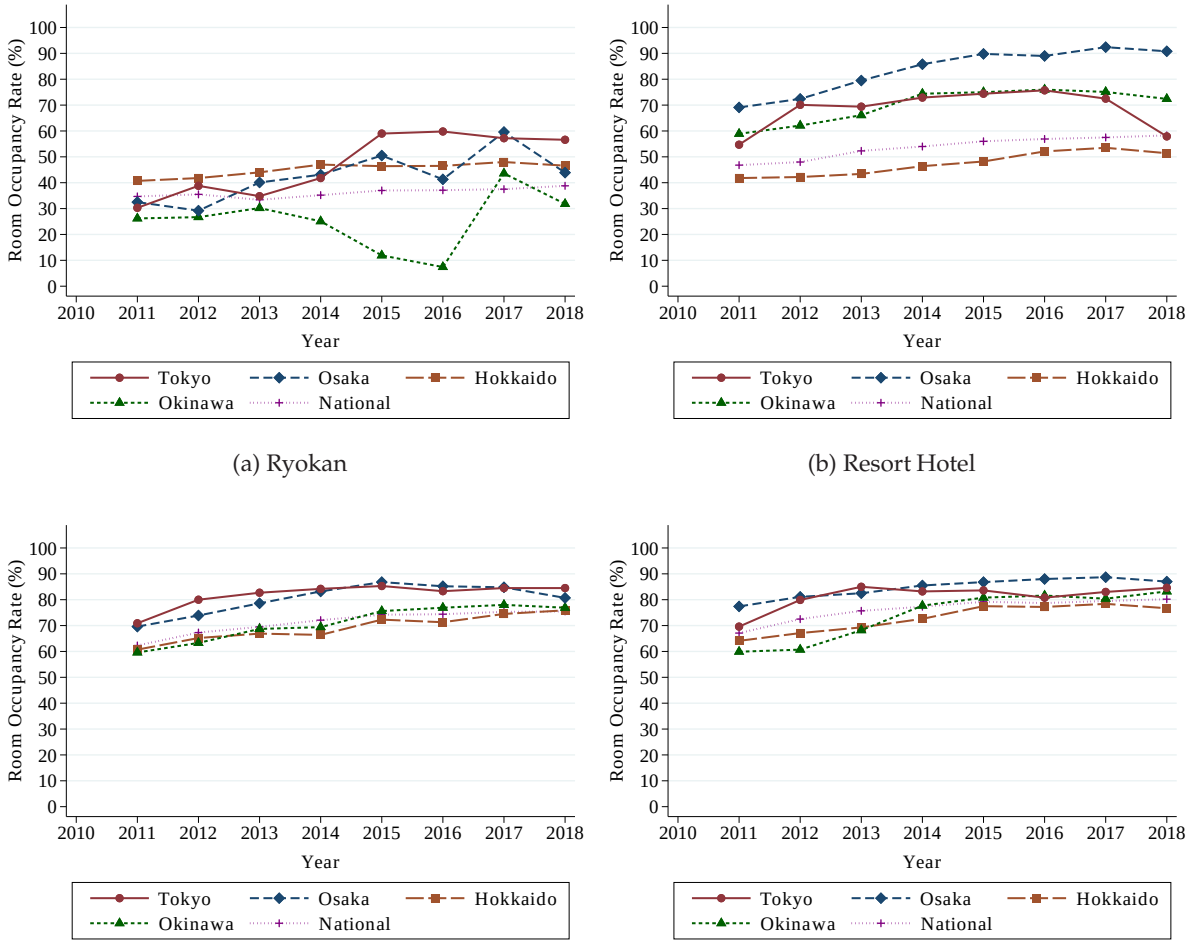


Figure 1 Increase in International Tourism (1963–2018)

Note: Created by the author using data publicly released by the Japan National Tourism Organization.



(a) Ryokan

(b) Resort Hotel

(c) Business Hotel

(d) City Hotel

Figure 2 Room Occupancy Rate for Selective Prefectures by Type of Accommodation

Note: Created by the author using public data from the Overnight Travel Statistics Survey (Japan Tourism Agency, the Ministry of Land, Infrastructure, Transport and Tourism).

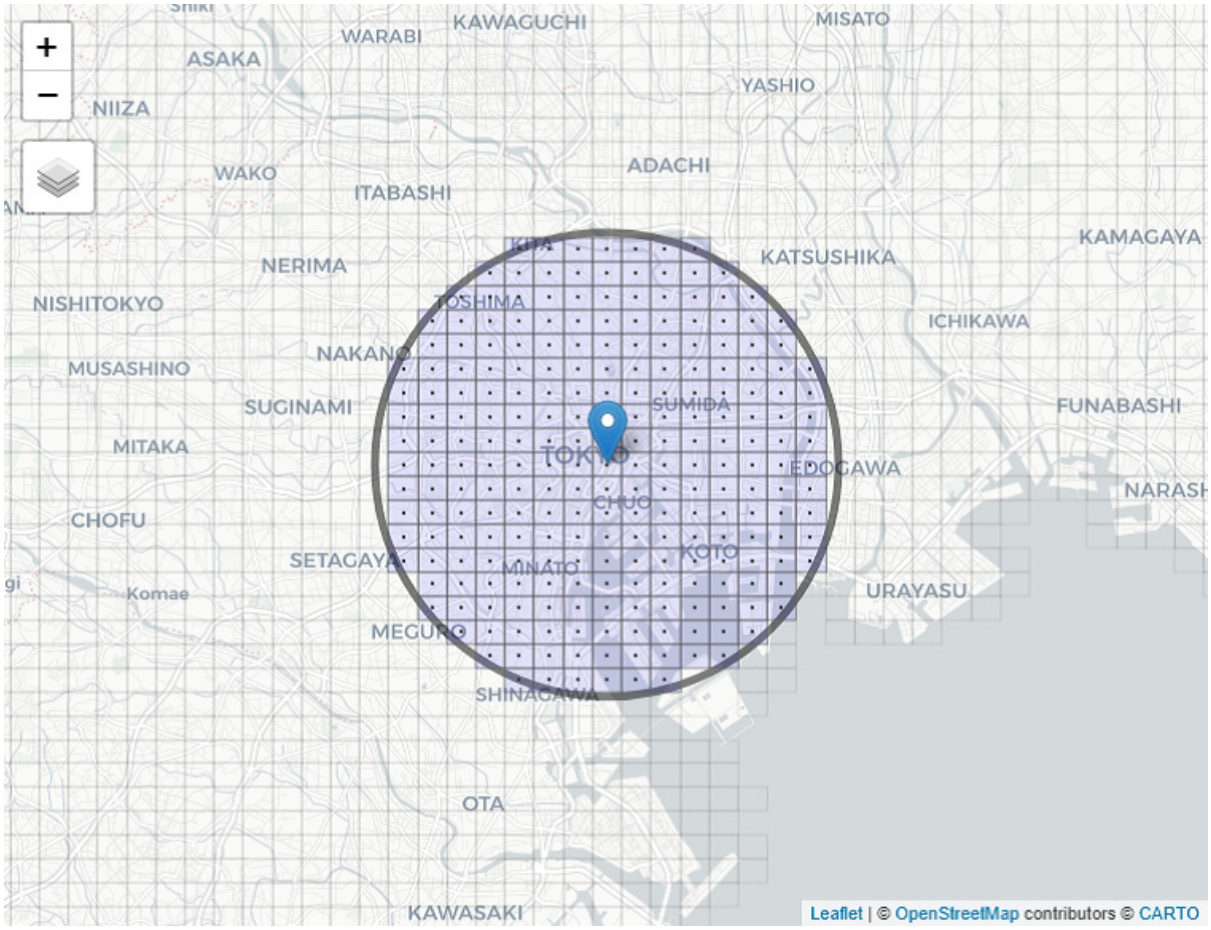
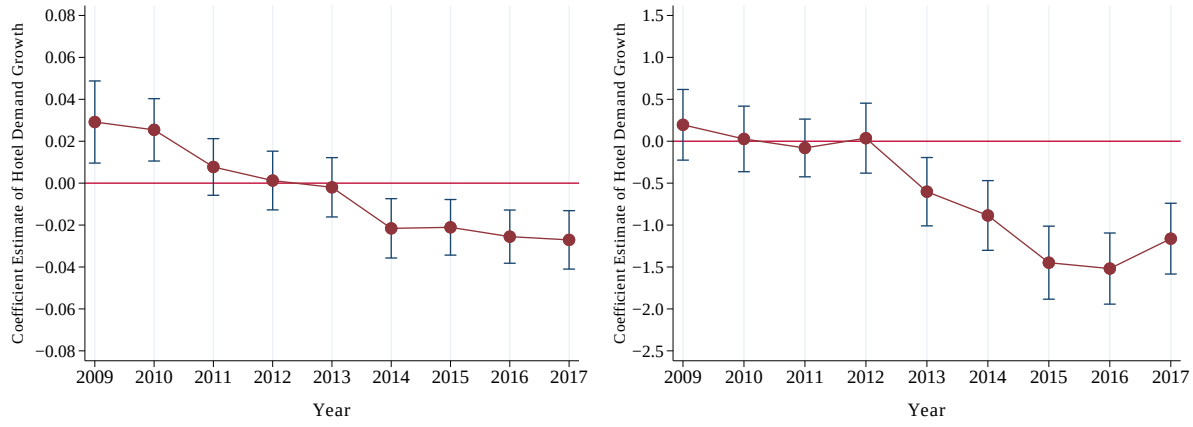


Figure 3 Urban Agglomeration Variable Based on a 9 km Radius

Note: Author's creation. Urban agglomeration is measured by neighboring employment within a 9 km radius, constructed from the Grid Square Statistics at the approximately a 1 km by 1 km level (Statistics Bureau, Ministry of Internal Affairs and Communications). This example depicts the 9 km radius from the centroid of the grid square where Tokyo station is located.

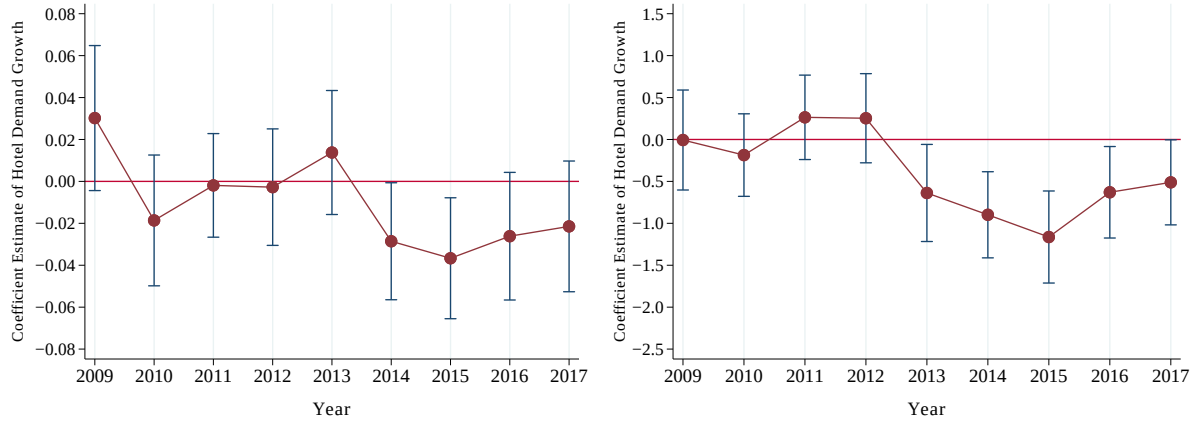


(a) Japanese ← Foreigner

(b) Foreigner ← Japanese

Figure 4 Demand Competition between Japanese and Foreign Visitors by Year in Business Hotel

Note: The circle marker represents the point estimate of urban agglomeration variables on the number of guest nights per month. The line represents the upper and lower bounds of the 95% confidence interval.

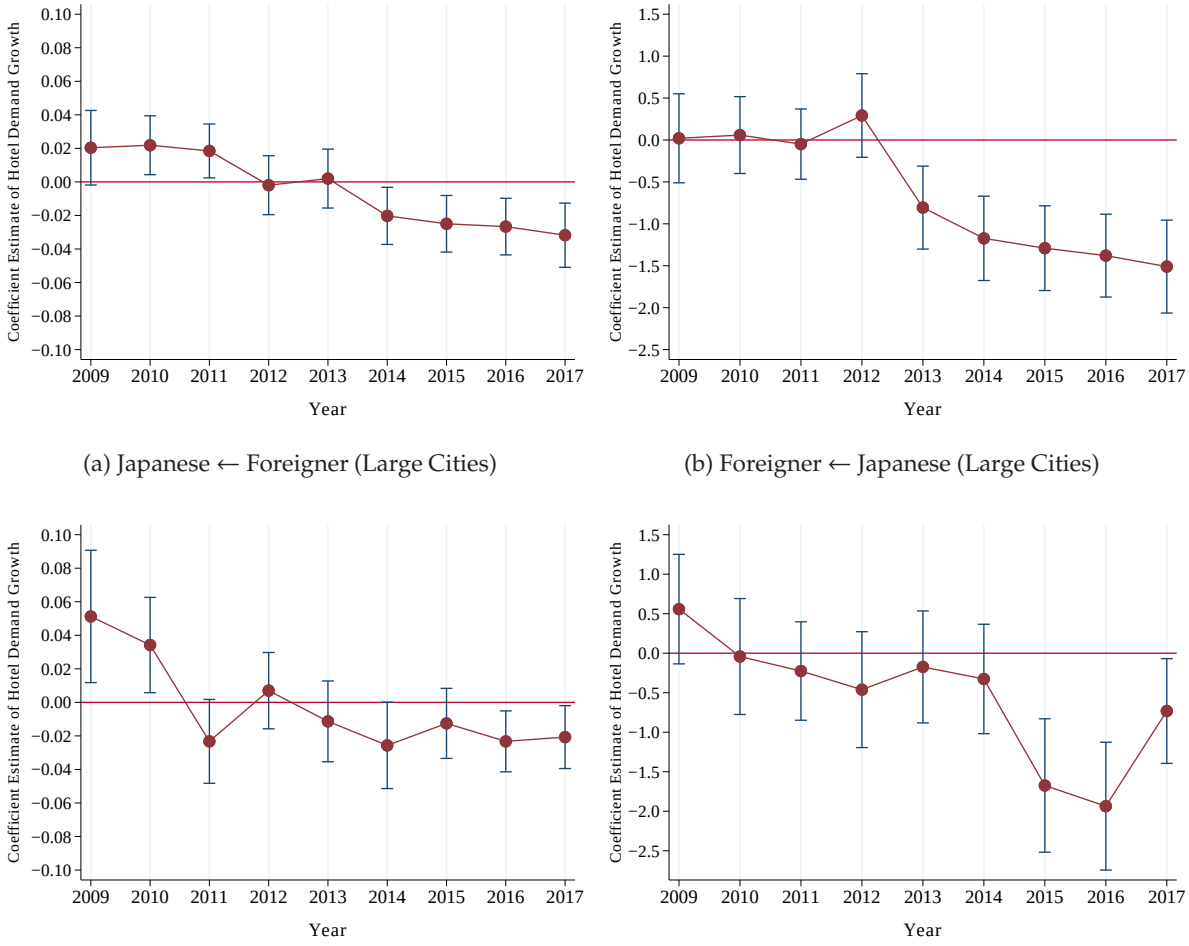


(a) Japanese ← Foreigner

(b) Foreigner ← Japanese

Figure 5 Demand Competition between Japanese and Foreign Visitors by Year in City Hotel

Note: The circle marker represents the point estimate of urban agglomeration variables on the number of guest nights per month. The line represents the upper and lower bounds of the 95% confidence interval.



(a) Japanese ← Foreigner (Large Cities)

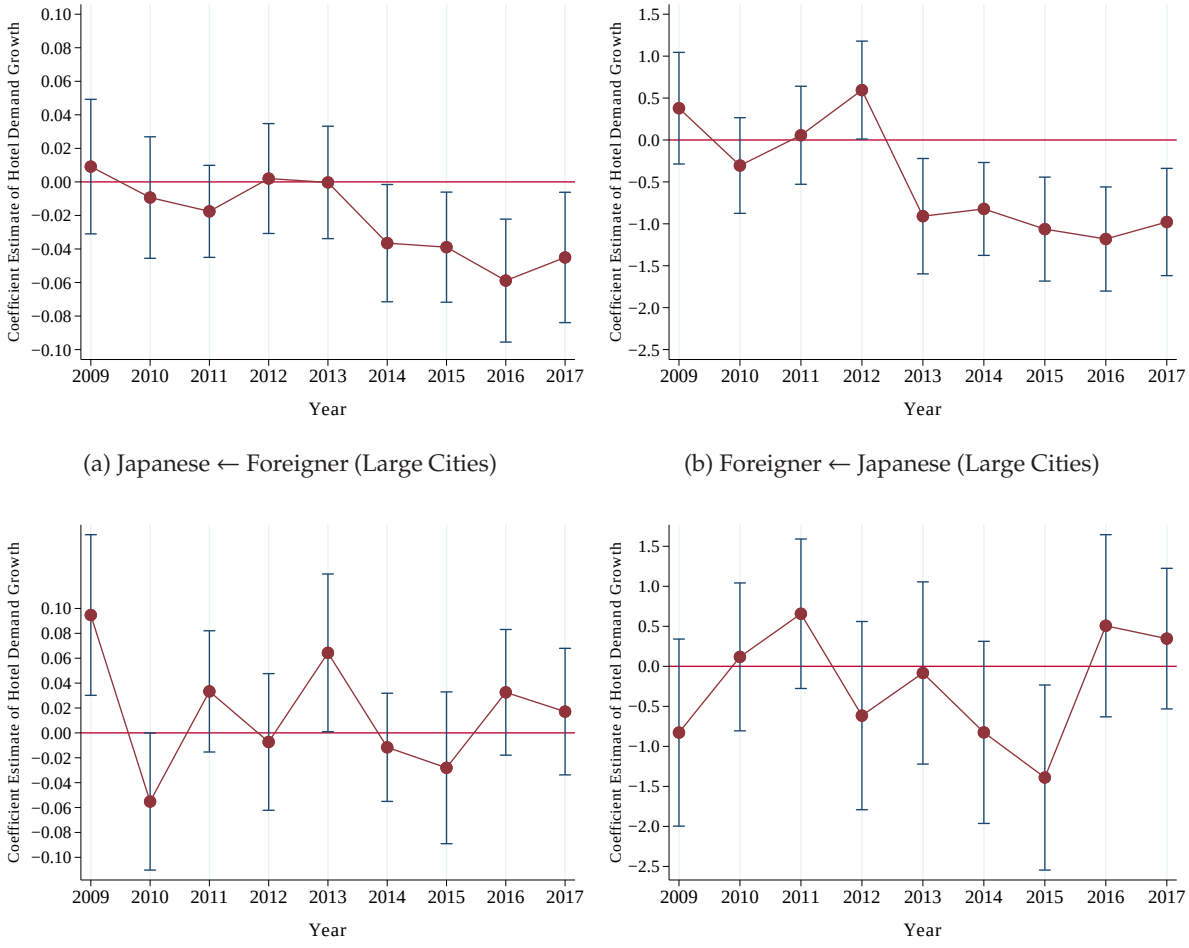
(b) Foreigner ← Japanese (Large Cities)

(c) Japanese ← Foreigner (Small Cities)

(d) Foreigner ← Japanese (Small Cities)

Figure 6 Demand Competition between Japanese and Foreign Visitors by Year and City Size in Business Hotel

Note: The circle marker represents the point estimate of urban agglomeration variables on the number of guest nights per month. The line represents the upper and lower bounds of the 95% confidence interval. Large cities are classified if the logarithm of urban agglomeration is greater than 12 (approximately, 162,755 workers within 9 km a radius). Small cities are classified if the logarithm of urban agglomeration is less than 12.



(a) Japanese ← Foreigner (Large Cities)

(b) Foreigner ← Japanese (Large Cities)

(c) Japanese ← Foreigner (Small Cities)

(d) Foreigner ← Japanese (Small Cities)

Figure 7 Demand Competition between Japanese and Foreign Visitors by Year and City Size in City Hotel

Note: The circle marker represents the point estimate of urban agglomeration variables on the number of guest nights per month. The line represents the upper and lower bounds of the 95% confidence interval. Large cities are classified if the logarithm of urban agglomeration is greater than 12 (approximately, 162,755 workers within 9 km a radius). Small cities are classified if the logarithm of urban agglomeration is less than 12.