Flight noise and housing markets:
Evidence from new flight paths of Haneda airport

○Takeru Sugasawa[1], Yuta Kuroda[2], Kai Nomura[3], Shohei Yasuda[4], Jun Yoshida[5]

1. Introduction

While a well-developed transportation network is a crucial factor supporting urban economic activities, it also generates traffic noise, which is a serious form of urban pollution. Economists have analyzed the willingness to pay to avoid exposure to traffic noise through changes in housing prices and rental rates (e.g. Winke: 2017). However, identifying the impact of noise is challenging due to potential endogeneity issues. For instance, these issues arise because routes may be designed to minimize the noise impact on surrounding areas.

We use the introduction of new landing paths of Haneda airport as a natural experiment to analyze the impact of flight noise on the housing market. Since the new landing paths at Haneda airport fly in a straight line over the Tokyo metropolitan area towards the runways, the regions below the new flight paths can be considered to have been exogenously determined. Furthermore, the introduction of the new landing flight paths did not involve runway construction or the discontinuation of other flight paths, minimizing other impacts on peripheral areas. Moreover, the area directly below the new landing paths is one of the most developed urban areas in the world, making it an ideal case study for examining the impact of noise pollution on the housing market of a metropolitan area.

2. Data and Estimation Design

The paper utilizes transaction data for both sales and rental housings recorded by East Japan REINS to examine the impact of the new landing flight paths of Haneda airport, initiated on March 29, 2020. The analysis employs a hedonic approach and covers the period from March 29, 2017, to March 28, 2023.

Based on the observed noise levels directly beneath the new flight paths, we estimated the attenuation of noise levels with increasing distance from Haneda Airport by using noise level measured by the national government. For the treatment group, we used properties located within 10 km along the extended centerline of the Haneda Airport runway and within 0.5 km, 0.5-1 km, and 1-1.5 km perpendicular to this centerline. For the control group, we used properties located within 10 km along the extended centerline of the runway and within 1.5 to 5 km perpendicular to this centerline. In our analysis, we accounted for fixed effects by town (*cho-cho*) and year to consider the potential differential impacts of the COVID-19

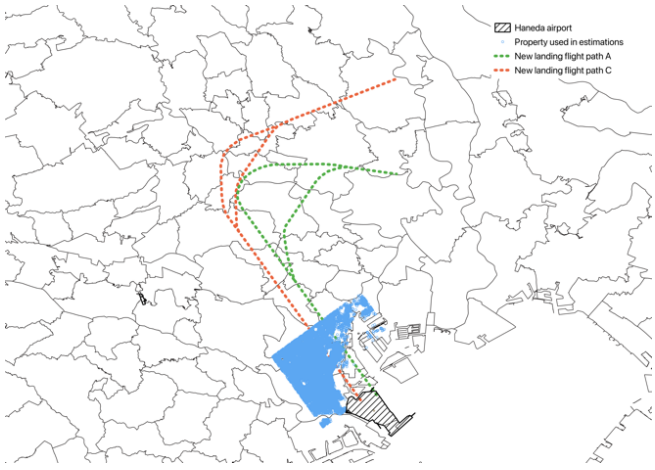

Figure 1. New landing flight paths of Haneda Airport and properties used in estimations

[1] Housing Research & Advancement Foundation of Japan, 102-0084, Japan; E-mail: sugasawa@hrf.or.jp
[2] Osaka Metropolitan University, 558-8585, Japan; E-mail: kuroyu0725@gmail.com
[3] Yamanashi Eiwa College, 400-0802, Japan; E-mail: k.nomura@yamanashi-eiwa@ac.jp
[4] Nihon University, 101-8360, Japan; E-mail: yasuda.shohei@nihon-u.ac.jp
[5] Tohoku Gakuin University, 980-0065, Japan; E-mail: junyoshida@mail.tohoku-gakuin.ac.jp

pandemic on regional economies across different areas and years.

3. Estimation Results

The estimation results reveal that, following the commencement of the new landing flight paths at Haneda airport, housing prices decreased by approximately 4.8% within 0.5 km of the new landing flight paths. This suggests that exposure to noise from aircraft flying directly overhead negatively impacted the below sales housing market. On the other hand, housing rent were not significantly affected by the initiation of the new flight paths. These findings remained robust across various distance bands and robustness checks. Subsample analyses show that the price decline following the commencement of the new flight paths was more pronounced for lower-priced homes and those that had been built longer ago. These findings indicate that lower-quality properties are more susceptible to the negative impacts of noise pollution. Additionally, analysis using estimated noise levels calculated from measurements by the government revealed that a 1 dB increase in the average monthly noise level measured as Lden resulted in approximately a 0.09% decrease in housing prices.

4. Discussions and Conclusion

The coefficient of approximately 0.09% decrease in housing prices per 1 dB increase in flight noise exposure from our estimation is substantially smaller than those reported in previous studies that have examined the impact of flight noise exposure on housing prices (e.g. approximately 1.7% estimated by Winke: 2017). One possible explanation is that in the highly urbanized Tokyo metropolitan area, there was already significant urban noise prior to the commencement of the new flight paths, making the impact of additional noise more limited. Furthermore, previous studies have indicated that in highly demanded housing markets, the negative impact of traffic noise on housing prices tends to be weaker (Von Graevenitz: 2018). In the highly urbanized Tokyo metropolitan area, the impact of noise might be smaller compared to the cases in previous studies.

For the reasons mentioned above, previous studies that focused on areas where flight paths were set to avoid regions with dense economic activity, or where airplanes were already flying and selection bias in housing and residents might have occurred, may have overestimated the impact of flight noise on the housing markets. Consequently, these studies may be inadequate for explaining the impact of flight noise in highly developed urban areas like Tokyo.

	(1)	(2)
Sample:	Transactions for sale	Transactions for rent
Dependent variable:	$\ln price$	$\ln rent$
After new flight paths started	0.0043	-0.0097***
	(0.0111)	(0.0031)
$0-500m$ from new flight paths	-0.0014	0.0163
	(0.0446)	(0.0164)
$500-1000m$ from new flight paths	0.0032	0.0018
	(0.0420)	(0.0127)
$1000-1500m$ from new flight paths	0.0282	-0.0023
	(0.0338)	(0.0116)
$0-500m$ from new flight paths × After new flight paths started	-0.0484***	-0.0005
	(0.0167)	(0.0075)
$500-1000m$ from new flight paths × After new flight paths started	-0.0193	-0.0063
	(0.0139)	(0.0090)
$1000-1500m$ from new flight paths × After new flight paths started	-0.0207	0.0047
	(0.0173)	(0.0083)
Property characteristics control	Y	Y
Distance from amenities control	Y	Y
Floor-plan FE	Y	Y
# of rooms FE	Y	Y
Building construction FE	Y	Y
Located floor FE	Y	Y
# of stories FE	Y	Y
Street FE	Y	Y
Year FE	Y	Y
Month FE	Y	Y
Street × Year FE	Y	Y
# of observations	15,367	90,171
# of buildings	370	421
Adj R-sq	0.94	0.92

Table 1. Main Results

References

Von Graevenitz, K. (2018): "The amenity cost of road noise," Journal of Environmental Economics and Management, 90, 1–22.
Winke, T. (2017): "The impact of aircraft noise on apartment prices: a differences-in-differences hedonic approach for Frankfurt, Germany," Journal of Economic Geography, 17, 1283–1300.