Impact of Stadiums on Residential Land Values

Evidence From Japan

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Research Question

- What is the effect of stadium openings on land values?
  - Positive: Tu (2005), Ahlfeldt & Maennig (2010), Ahlfeldt & Kavetsos (2014), Chikish et al. (2019)
  - Negative: Dehring et al. (2007), Joshi et al. (2020), Humphreys & Nowak (2017), Hyun (2022)
- While this question has been studied extensively, we contribute to the literature by:
  - Studying Japan, a new setting in this space.
  - Using novel data and up-to-date methodologies.
- We explore stadium openings across Japan between 1995 through 2022.
  - Land Market Value Publication (LMVP) is released by the Ministry of Land, Infrastructure, Transport, and Tourism.
  - Collect a panel of parcel-by-year per-square-meter land values.
  - We compare parcels near (within 5 km of) early-opening stadiums to parcels near later-opening stadiums.
  - Parcel fixed effects allow for a repeat-sales type of analysis.

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Identification: Timing of Stadium Openings

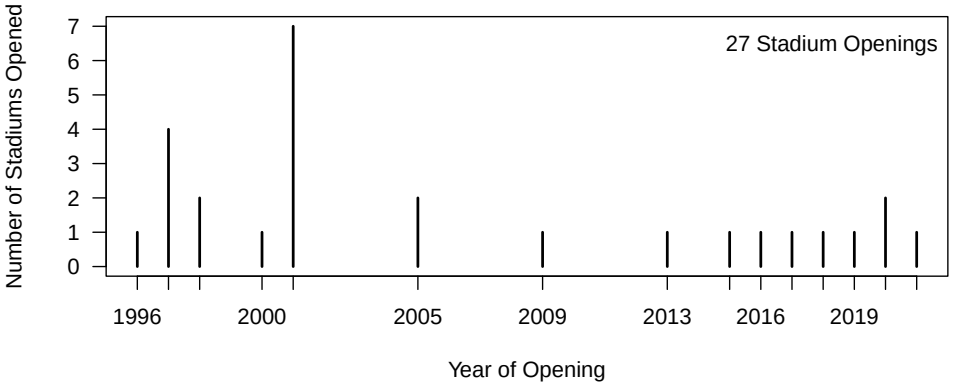

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Table 1: Effect of Stadium Construction on Land Values

	log(Land Value)	
Stadium Opened	-0.020	-0.007
	(0.033)	(0.018)
Controls	No	Yes
Parcel FE	Yes	Yes
Year FE	Yes	Yes
R2 Adj.	0.972	0.983
Num.Obs.	17388	17388

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Goodman-Bacon Decomposition

Table 2: Goodman-Bacon Decomposition

Comparison	Weight	Estimate
Earlier vs Later Treated	0.497	0.025
Later vs Earlier Treated	0.503	-0.065
Aggregate	1.000	-0.020

Notes: N = 17,388

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LP-DiD and 2S-DiD

Control Variables:

- Floor Area Ratio
- Acerage
- Building Coverage
- log(Habitable Area)
- log(Dist. to Train)
- Gas
- Sewage
- % of Pop. Aged 65
- Pop. Density
- log(Per-Capita Inc.)
- Fiscal Soundness

Method 1: Local Projections DiD – Compare treated units to only "clean" control units. (go to math)

Method 2: Two-Stage DiD – Use untreated observations to get unbiased estimates of FEs. Subtract these FEs from the full sample, and estimate the DiD parameter after. (go to math)

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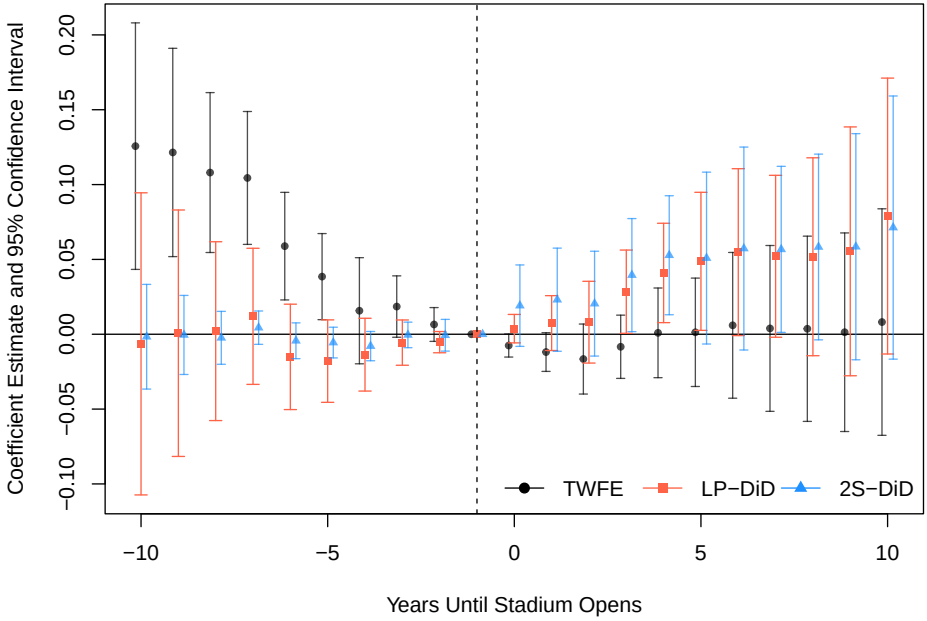
Coefficient Estimate and 95% Confidence Interval
0.20
0.15
0.10
0.05
0.00
−0.05
−0.10
TWFE
LP−DiD
2S−DiD
−10
−5
0
5
10
Years Until Stadium Opens

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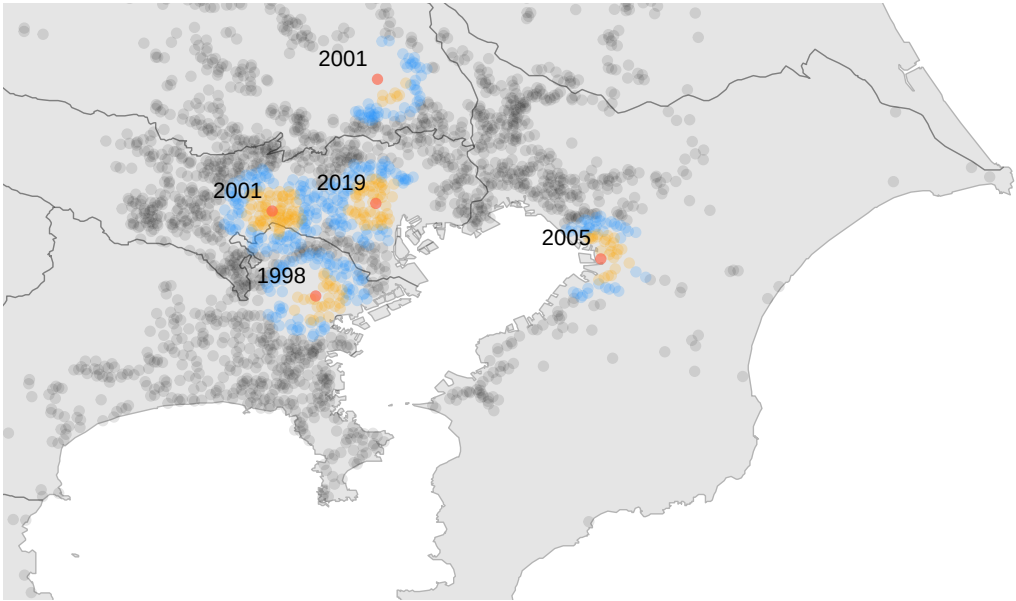
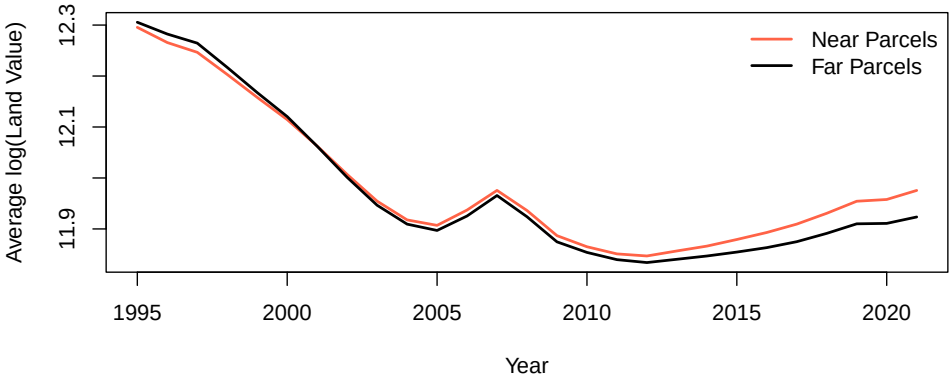
But what about "far" parcels?


2001
2001
2019
2005
1998

Price Trends of Near and Far Parcels



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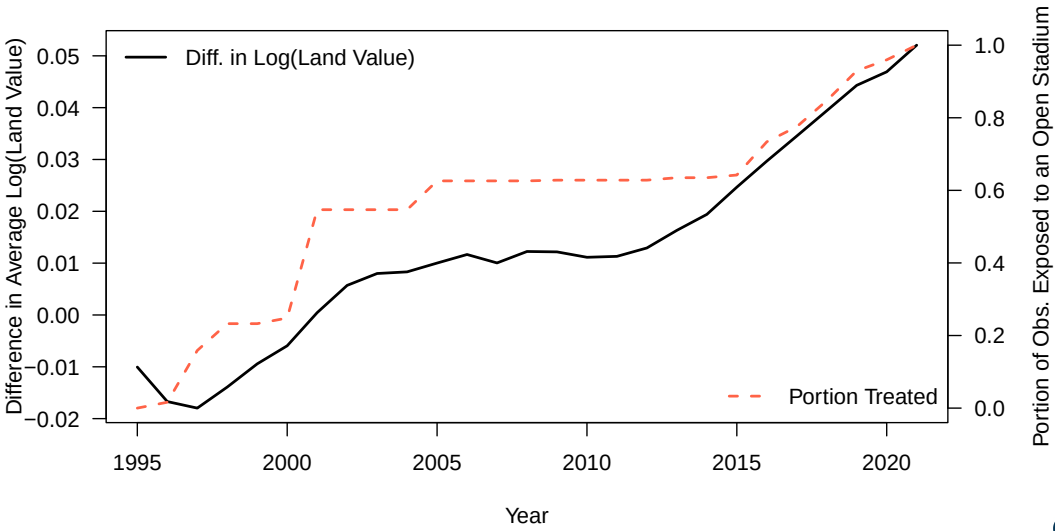
Difference Between Near and Far Parcels



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Incorporating "far" parcels

- Our first analysis leverages the timing of stadium openings for identification.
- Most other studies in the literature use proximity to the stadium for identification.
- Given the structure of our data, we can combine these two approaches. We can examine the difference in price between near and far parcels of early-opening stadiums before and after relative to the near-far price difference for later-opening stadiums.
  - This makes for a **triple difference** design, or DiDiD.
  - Olden & Møen (2022) demonstrate that only a single parallel trends assumption is needed for valid inference, so long as the assumption is violated in the same way across groups.

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Table 3: Goodman-Bacon Decompositions

	Near Parcels		Far Parcels	
Comparison	Weight	Estimate	Weight	Estimate
Earlier vs Later Treated	0.497	0.025	0.456	-0.014
Later vs Earlier Treated	0.503	-0.065	0.544	-0.068
Aggregate	1.000	-0.020	1.000	-0.043

Notes: Number of "Near" and "Far" observations: 17,388 and 22,761.

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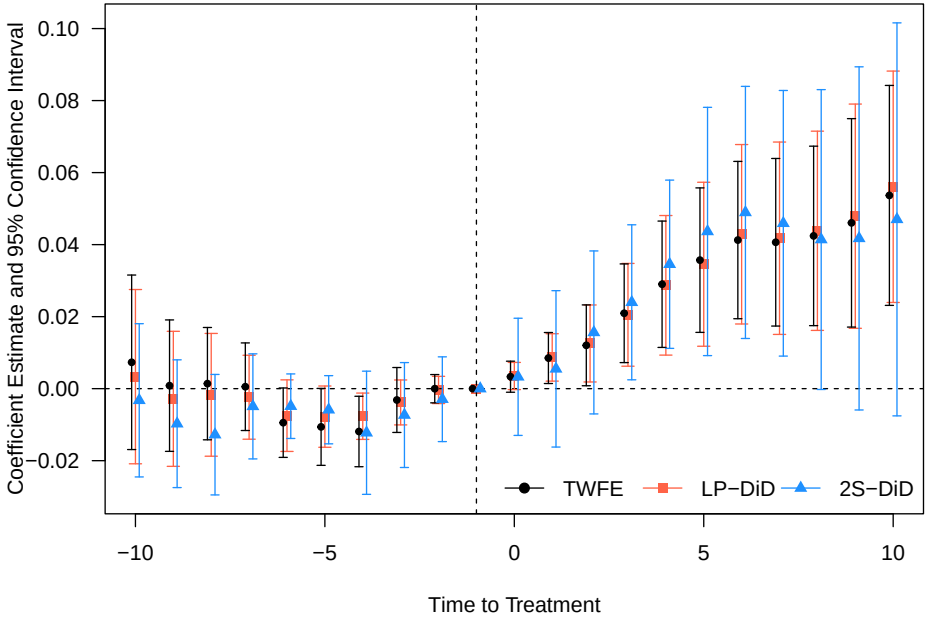
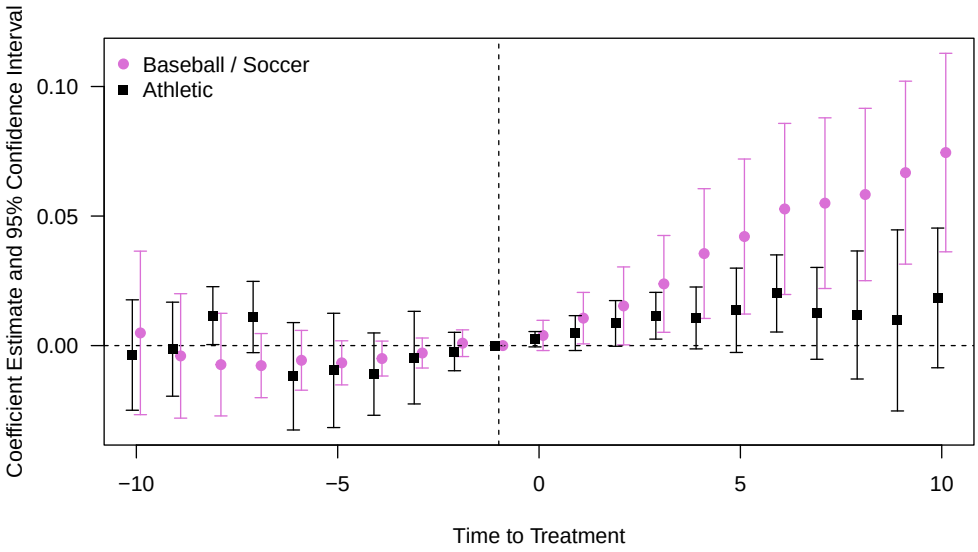

Coefficient Estimate and 95% Confidence Interval
0.10
0.08
0.06
0.04
0.02
0.00
−0.02
−10
−5
0
5
10
Time to Treatment
TWFE
LP−DiD
2S−DiD


Baseball / Soccer
Athletic
Coefficient Estimate and 95% Confidence Interval
0.10
0.05
0.00
−10
−5
0
5
10
Time to Treatment

Discussion

We find robust evidence of stadium openings increasing land values.

- Our estimates suggest an increase in land value of about 3 to 5%, most of which is due to proximity.
- Effects concentrate in team-centric stadiums.
- Our results are robust to alternative definitions of "near" and "far."
- A limitation is that we use assessment values rather than transaction prices.
  - Assessments are determined by transaction prices, and typically 1.1-1.2x transaction price (Nakagawa et al. 2009, Kanasugi & Ushijima 2018, Nishitateno & Burke 2021).
  - If taxes are a function of assessed value, an increase in assessed value may reduce transaction price through increased property taxes. Therefore, estimates using transaction prices may be negatively biased if effects are indeed capitalized in assessed values.

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$$\text{TWFE}: \; Y_{i,t} = \delta^{DD} D_{i,t} + \mu_i + \tau_t + u_{it}$$

$$\begin{aligned} Y_{i,t} - Y_{i,t-1} &= (\delta^{DD} D_{i,t} + \mu_i + \tau_t + u_{i,t}) \\ &\quad - (\delta^{DD} D_{i,t-1} + \mu_i + \tau_{t-1} + u_{i,t-1}) \\ &= \delta^{DD} \Delta D_{it} + (\mu_i - \mu_i) \\ &\quad + (\tau_t - \tau_{t-1}) + (u_{i,t} - u_{i,t-1}) \end{aligned}$$

$$Y_{i,t} - Y_{i,t-1} = \delta^{DD} \Delta D_{it} + \tau_t + u_{it}, \text{ where } D_{i,t} = 0 \text{ or } \Delta D_{i,t} = 1$$

$$Y_{i,t+h} - Y_{i,t-1} = \delta_h^{DD} \Delta D_{it} + \tau_t^h + u_{it}^h, \text{ where } D_{i,t+h} = 0 \text{ or } \Delta D_{i,t} = 1$$

2S-DiD Equation

(go to description)

$$\text{TWFE}: \; Y_{i,t} = \delta^{DD} D_{i,t} + \mu_i + \tau_t + u_{it}$$

$$\text{Stage 1}: \; Y_{it} = \mu_i + \tau_t + u_{it}, \text{ where } D_{it} = 0$$

$$\text{Stage 2}: \; Y_{it} - \widehat{\mu_i} - \widehat{\tau_t} = \delta D_{it} + u_{it}$$

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