Valuation of Long-Term Property Rights under Political Uncertainty

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Motivation

- Political uncertainty affects asset valuations as well as economic activity (Pástor and Veronesi (2013); Baker et al. (2016); Hassan et al. (2019)).
  - Developed economies with stable established political system
- We fill the gap: study Hong Kong's property market & identify a causal link between political uncertainty and housing prices.
  - A political battleground for the fate of the unprecedented political experiment "One Country, Two Systems."
    - Well-functioning financial market allowing us to study valuations
  - Land granted by the government for a fixed term, but subject to renewal by another different government
  - Hong Kong is also known for its notoriously expensive housing market

Main Identification

- Empirical challenge: the difficulty in isolating exogenous variation in the political uncertainty from asset valuations.
- The impending uncertainty of the political outlook of Hong Kong resolves on a predetermined future date (July 1st, 2047).
- We exploit the heterogeneity among land lease extension protections that are linked to the expiry of the HKSAR in 2047.
  - The historical arrangements (the Basic Law and “One Country, Two Systems") are set to expire in July 1st, 2047.
  - Land leases expiring on June 30th, 2047, right before the expiry of the HKSAR, that have been promised a 50-year extension protection.
  - Those expiring immediately after that date are left unprotected largely.

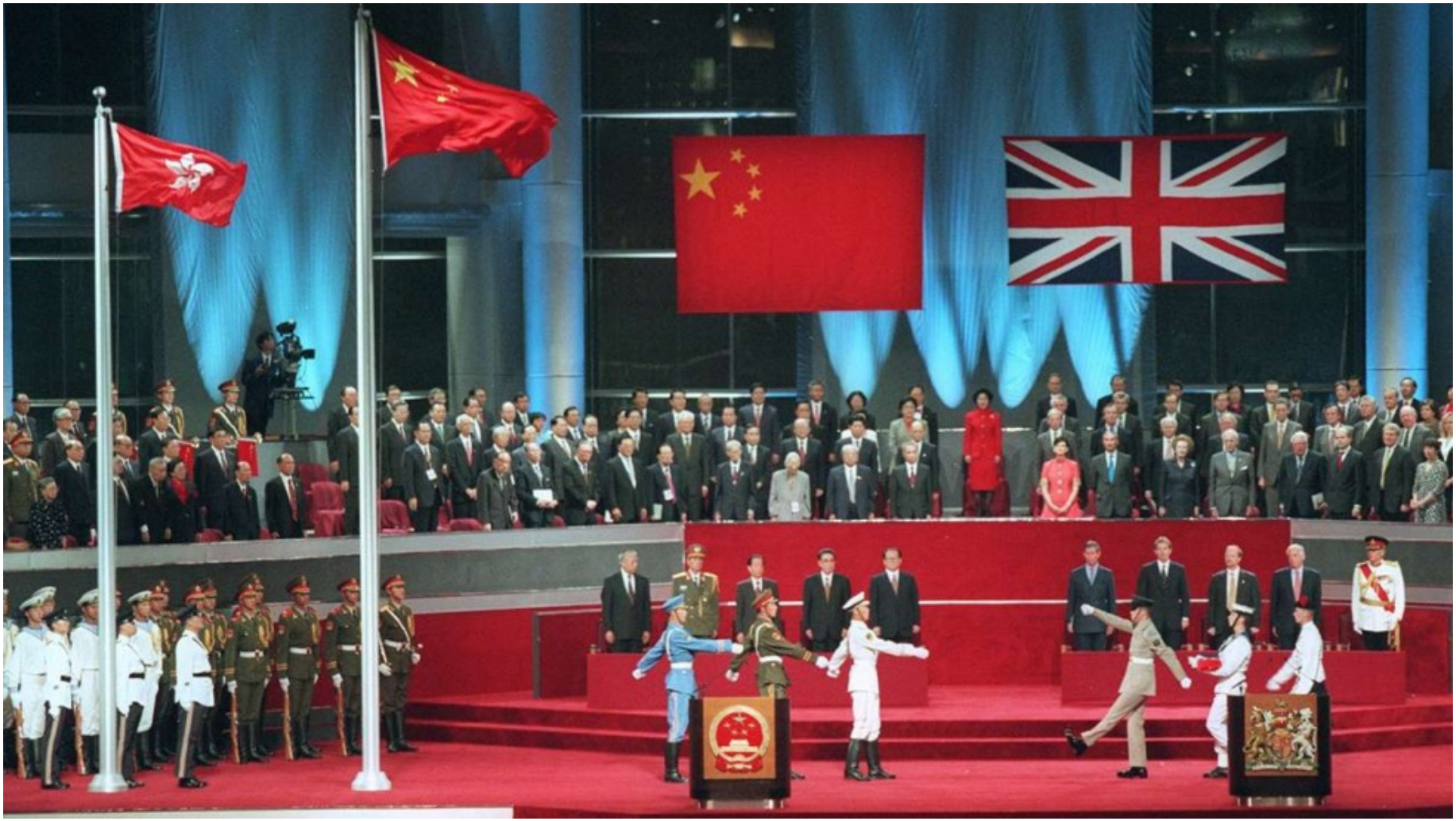
Outline

1. Motivation and Institutional Background
2. Main Analysis
   - Model Framework and Assumption
   - Data, and Baseline Analysis
   - Reneging Risk and Calibrated Model
3. Political Uncertainty: District-Level Evidence
4. Conclusions

A Brief History of Hong Kong: Before the Handover

- First and Second Opium War in 1841 and 1860: British forced the Qing China to cede Hong Kong Island.
- British forced the Second Convention of Peking (1898), leasing New Territories to Britain for 99 years until June 30th, 1997.
- The Sino-British Joint Declaration (JD), ratified on May 27th, 1985, lays out the groundwork for the handover.
- The Basic Law, as the de facto constitution adopted in 1990, reflects the principle of “One Country, Two Systems."

A Brief History of Hong Kong: the Handover



– This handover event ended 156 years of British colonial rule in Hong Kong.

A Brief History of Hong Kong: After the Handover

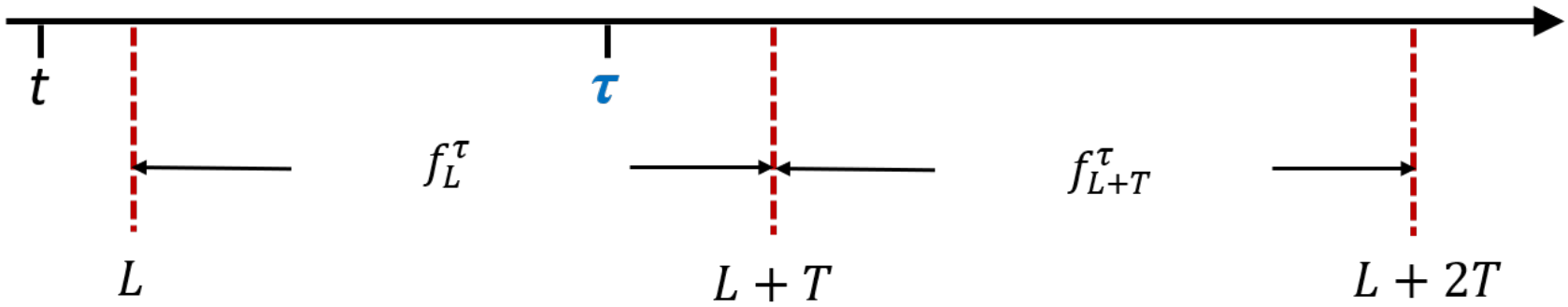
- Hong Kong has experienced significant changes in all aspects of society.
- While the Basic Law guarantees a high degree of autonomy, concerns over Beijing's interference have been present and intensified over the years.
- Two broad political alignments, **pro-establishment** camp and **pro-democracy** camp, after the 2004 Legislative Council (LegCo) election,
- Article 23, National Security Laws, and massive protests/unrest in 2014 and 2019-20.

Land Leases in Hong Kong

- A housing property generates a "natural" rent $\hat{R}_t$ growing at g, $\hat{R}_t = \frac{e^{gt}}{1-3\%}$.
  - 3% is the current baseline ground rent, so current effective rent $R_t = e^{gt}$.
  - Upon renewal, with extra ground rent $f_s^{(\tau)}$ imposed by government, e.g.

$$f_s^{(\tau)} = \gamma \mathbf{1}_{\{s \geq \tau\}}, \text{ with } \tau = 7/1/2047.$$

- Renewal dates L, lease extension term $T = 50$.



Different Types of Land Leases

Before the JD

- Type 1: The earliest leases in 1843, 999 years.
- Type 2 & 3: 1843–1898, the British government, “75" year leases or “99" year leases; 1899–1985, the British government, “75 + 75" year leases (some “99 + 99" years).
- **Type 4**: Non-renewable leases in New Kowloon and New Territories that expired on June 27th, 1997 (the 1898 Second Convention of Peking).
  - Extended to June 30th, 2047; a more exogenous control group

After the JD

- Type 5: 1985 JD – June 30th, 1997: set to expire on June 30th, 2047;
  - with terms ranging from 50 to 62 years.
- Type 6: Post July 1st, 1997: set to expire 50 years after the auction date
  - those on January 1st, 2000, are set to expire on January 1st, 2050; so on so forth.

Government Renewal Decisions

- Regrant or extend non-renewable leases upon their expiry;
  - E.g., 1951 for the 75-year Kowloon leases auctioned from 1876
- So far, the government has kept offer extension with a ground rent of 3%;
  - Unless the land is needed for public purposes.
- The ground rent can be increased, and the lessee is subject to pay additional premium at extension;
  - Summarized by potential increase of ground rent in the model;
- Some other decisions.....

Political Uncertainty Regarding the Renewal/Regrants

- The Basic Law and the HKSAR are set to expire in July 1st, 2047.
- What about the land leases that have been renewed/extended by the HKSAR beyond this official expiration date?
  - Say, leases on January 1st, 2000 that expiring on January 1st, 2050.
- On July 15th, 1997, the HKSAR affirmed its constitutional authority to grant land leases beyond July 1st, 2047 by another 50 years
  - "*There is no provision in the Basic Law that restrict the otherwise unlimited power of the HKSAR to grant land leases beyond 2047.*"
- Neithre clarity nor guarantee to leases expiring after June 30th, 2047.
  - say, the government could raise the ground rent 3% to 25% at renewal on January 1st, 2050.

Model

- A housing property generates a "natural" rent $\hat{R}_t$ growing at g, $\hat{R}_t = \frac{e^{gt}}{1-3\%}$.
  - 3% is the current baseline ground rent, , so current effective rent $R_t = e^{gt}$.
  - But, with extra ground rent $f_s^{(\tau)}$ imposed by the government, e.g.

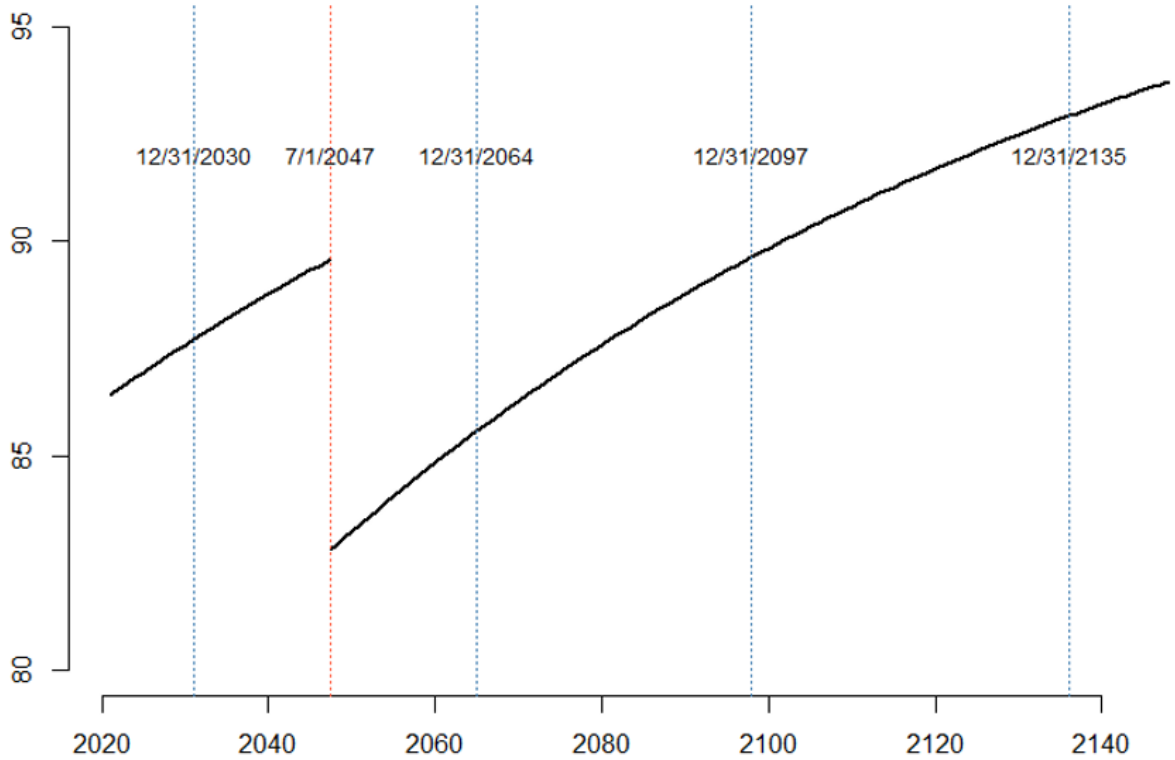
$$f_s^{(\tau)} = \gamma \mathbf{1}_{\{s \geq \tau\}}, \text{ with } \tau = 7/1/2047.$$

- Renewal date L and lease extension term $T = 50$. At any future date $s > L$,
  - Looking back at s, $L + T \cdot N(s)$ is the most recent date of lease renewal.
  - $N(s) \equiv \lfloor \frac{s-L}{T} \rfloor$ is the largest integer that is below $\frac{s-L}{T}$.
- House owner's cash flows at future date s then are

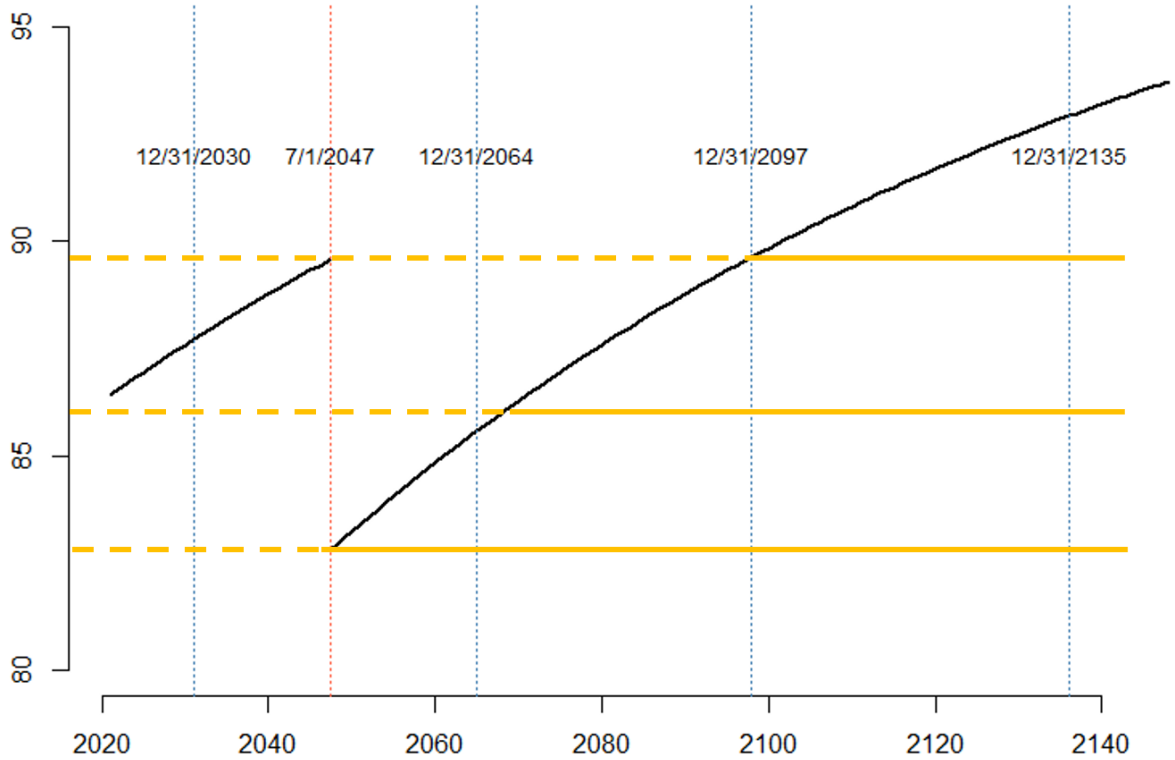
$$R_s = e^{gt} \cdot (1 - \gamma \mathbf{1}_{L+T \cdot N(s) \geq \tau})$$

  - e.g., $L = 1/1/2000 < \tau$, ground rent jumps up to $\gamma > 0$ only after $1/1/2050$
- House price P_t equals discounted future cash-flows (discount rate r)

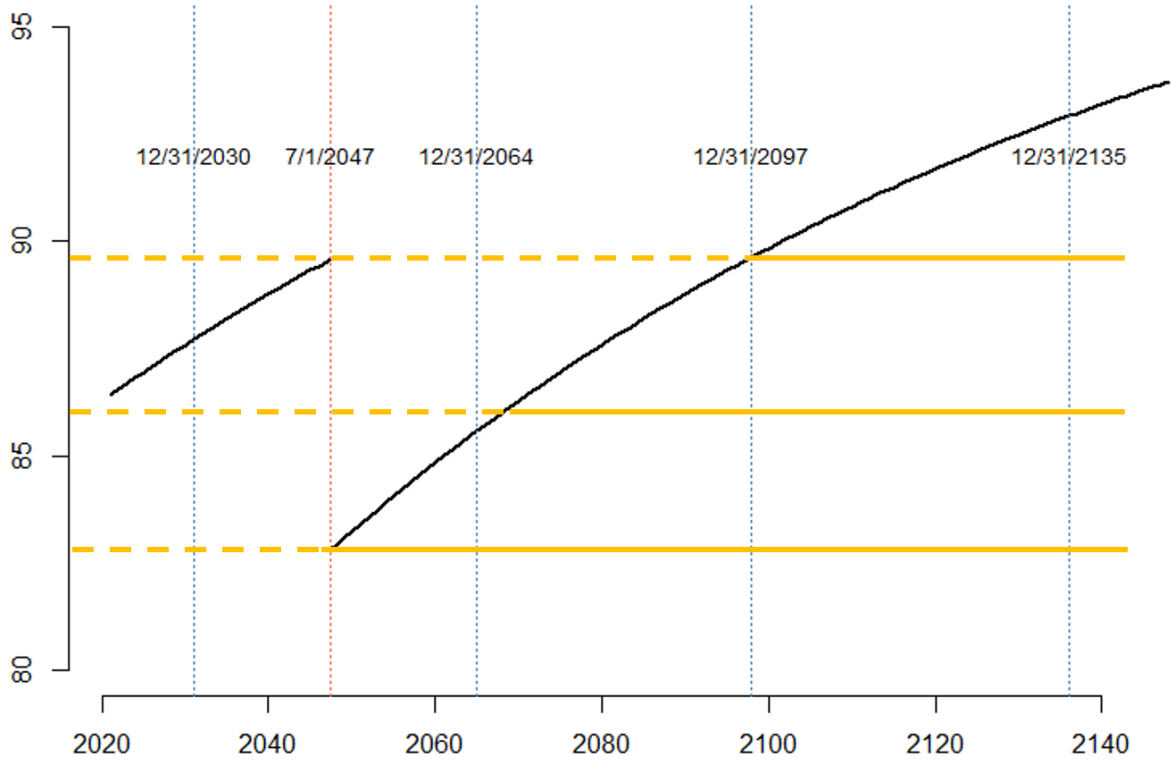
Model: Illustrating Examples of House Price



Model: Illustrating Examples of House Price



Model: Illustrating Examples of House Price



- **Key assumption**: the 50-year renewal commitment made by HKSAR before 2047–but in effect beyond 2047–will be honored by the new HK government after 2047.
  - Policy continuity is respected in previous negotiations b/w UK, China, and HK

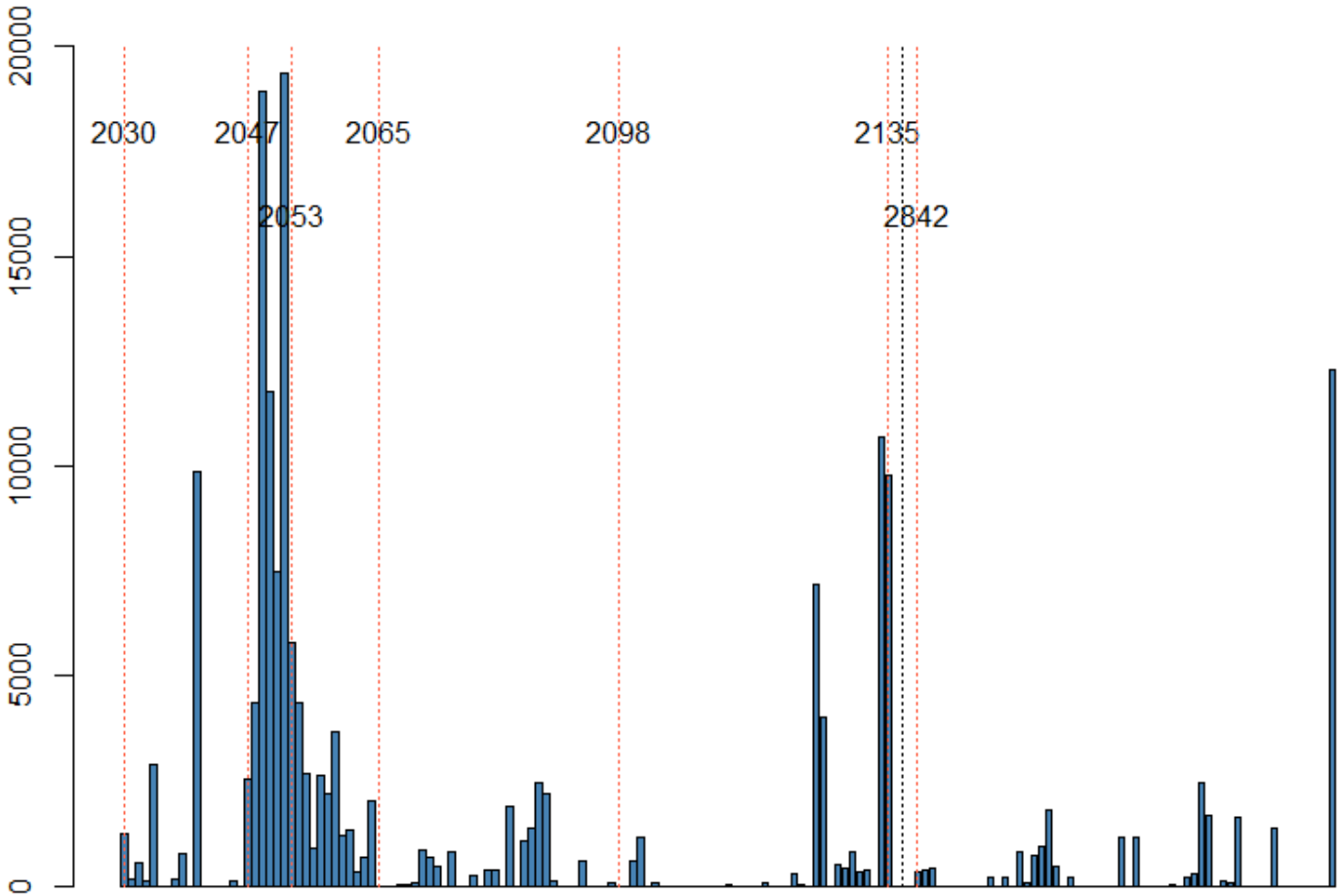
Data

- Residential transactions and amenities in Hong Kong starting from 1992 and updated through February 2020.
- Transaction data contains only the year of lease expiration, not the date.
  - Separate leases expiring before & after 07/01/2047: land auction data
- Hong Kong Quinquennial Census Data and Local Elections.
- Final sample: 551,790 residential housing transactions sold from 1998 to February 2020
  - after excluding obs missing data on characteristics, government projects and non-arm's length transactions.
  - land grant year ≠ building age.

Empirical Identification

- Control group contains all the leases set to expire on June 30th, 2047.
  - All existing non-renewable leases that were going to expire before June 30th, 1997, were automatically extended to June 30th, 2047.
    - Type 4, determined by Second Convention of Peking in 1998
  - Any land auctioned between May 27th, 1985, and June 30th, 1997, *i.e.*, after JD but before the handover, are set to expire on June 30th, 2047.
- Treatment lease groups
  - Pre-2047 leases: all the leases set to expire before 2047.
  - Post-2047 leases: further decomposed into four groups (July 1st 2047–2049, 2050–2052, 2053–2064, and 2065–2097); leases granted by the British HK and HKSAR.
  - Distant leases: 2098–2135 and 2842–2959.

Number of Transactions: by Expiration Years



- Lease groups constructed so that all have sufficient observations in regressions.

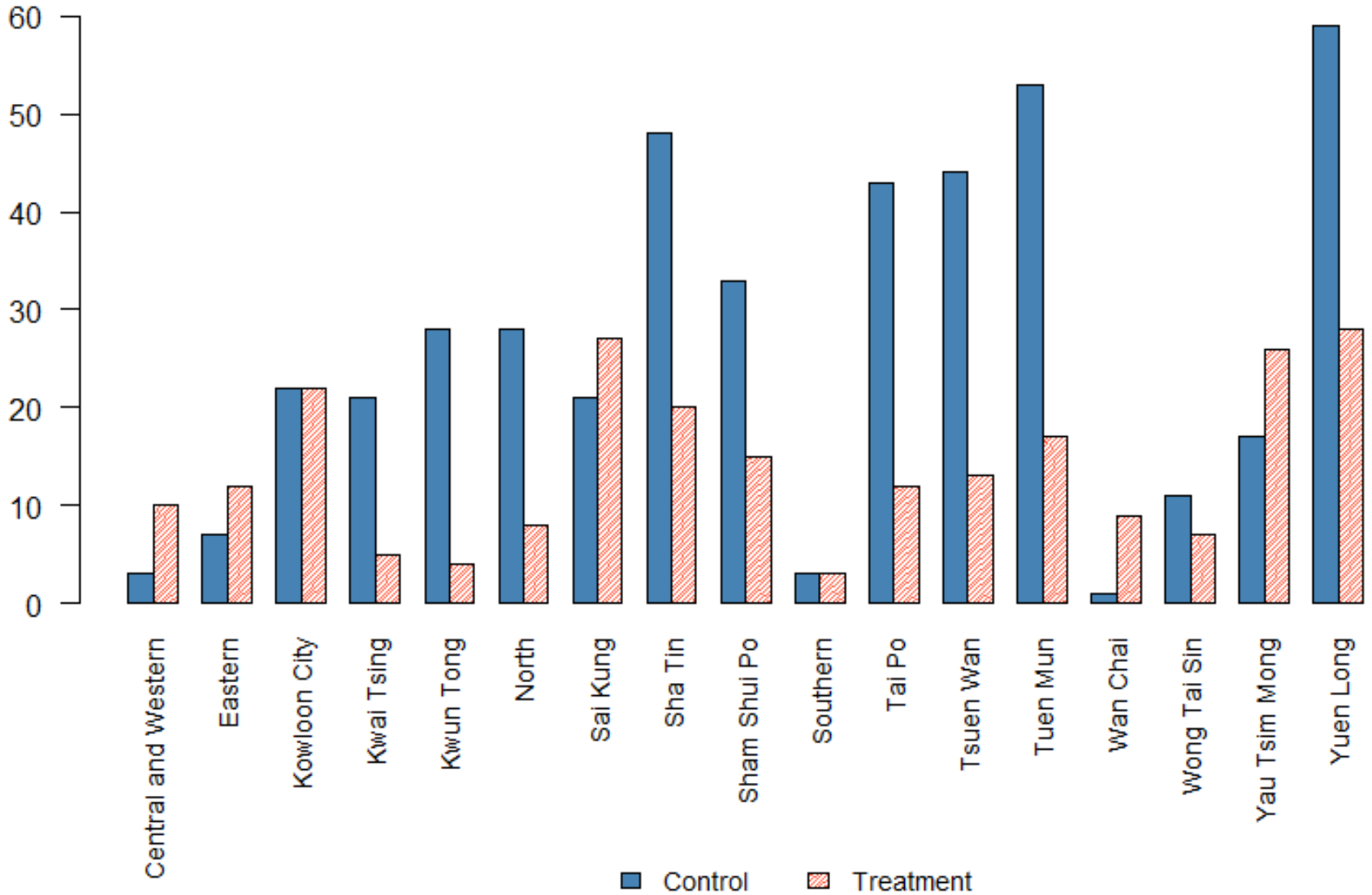
Empirical Specification

Baseline: hedonic regression (Rosen, 1974), relative price discounts of all other leasehold groups compared to main control lease group:

$$\ln(P_{i,t}) = \sum_{n=1}^{n=9} \beta_n \cdot Lease_n + \eta \cdot X_{i,t} + \alpha_{d \times m(t)} + \varepsilon_{i,t},$$

- $X_{i,t}$ is a full set of housing characteristics
  - Indicators for bay window, swimming pool and club house. Category dummies for number of bedrooms, number of living rooms, direction, floor group. Group dummies of 10 equally sized categories for bay window size, net size, building age, building completion year, distance to MRT/Bus Stop/Hospital/School/University/Coastal Line
- $\alpha_{d \times m(t)}$ represents the district $\times$ year-month fixed effects.
- Standard errors are two-way clustered by estate and year-month.

Geographic Distribution of Leases



Control vs. Treatment

Panel B: Split Samples

	Control Lease Group			Main Treatment Lease			Control -
Variable	N	Mean	SD	N	Mean	SD	Treatment
Log(Price)	363,923	0.89	0.62	92,407	1.40	0.63	-0.51***
Log(Unit Price)	363,923	8.51	0.53	92,407	8.95	0.51	-0.44***
Net Living Area Area	363,923	513.90	157.00	92,407	551.50	162.10	-37.67***
Floor	363,923	16.98	10.97	92,407	24.07	15.90	-7.08***
No of Bedrooms	363,923	2.06	0.98	92,407	2.06	0.98	0.00
No of Living Rooms	363,923	1.61	0.77	92,407	1.75	0.71	-0.14***
Bay Window Size	363,923	22.62	15.25	92,407	22.81	13.55	-0.19***
Building Age	363,923	16.44	8.41	92,407	9.46	8.02	6.98***
Building Completion Year	363,923	1991	7.31	92,407	2002	9	-11***
Distance To MRT	363,923	799	945	92,407	692	900	107***
Distance To Bus Stop	363,923	313	292	92,407	352	278	-39***
Distance To Hospital	363,923	1,689	1,382	92,407	1,549	1,181	140***
Distance To School	363,923	150	230	92,407	128	108	22***
Distance To University	363,923	4,010	2,539	92,407	3,349	2,365	661***
Distance To Coastal Line	363,923	1,608	1,742	92,407	1,254	1,634	354***
Turnover	363,923	0.079	0.043	92,407	0.082	0.050	-0.003***

Baseline Estimates

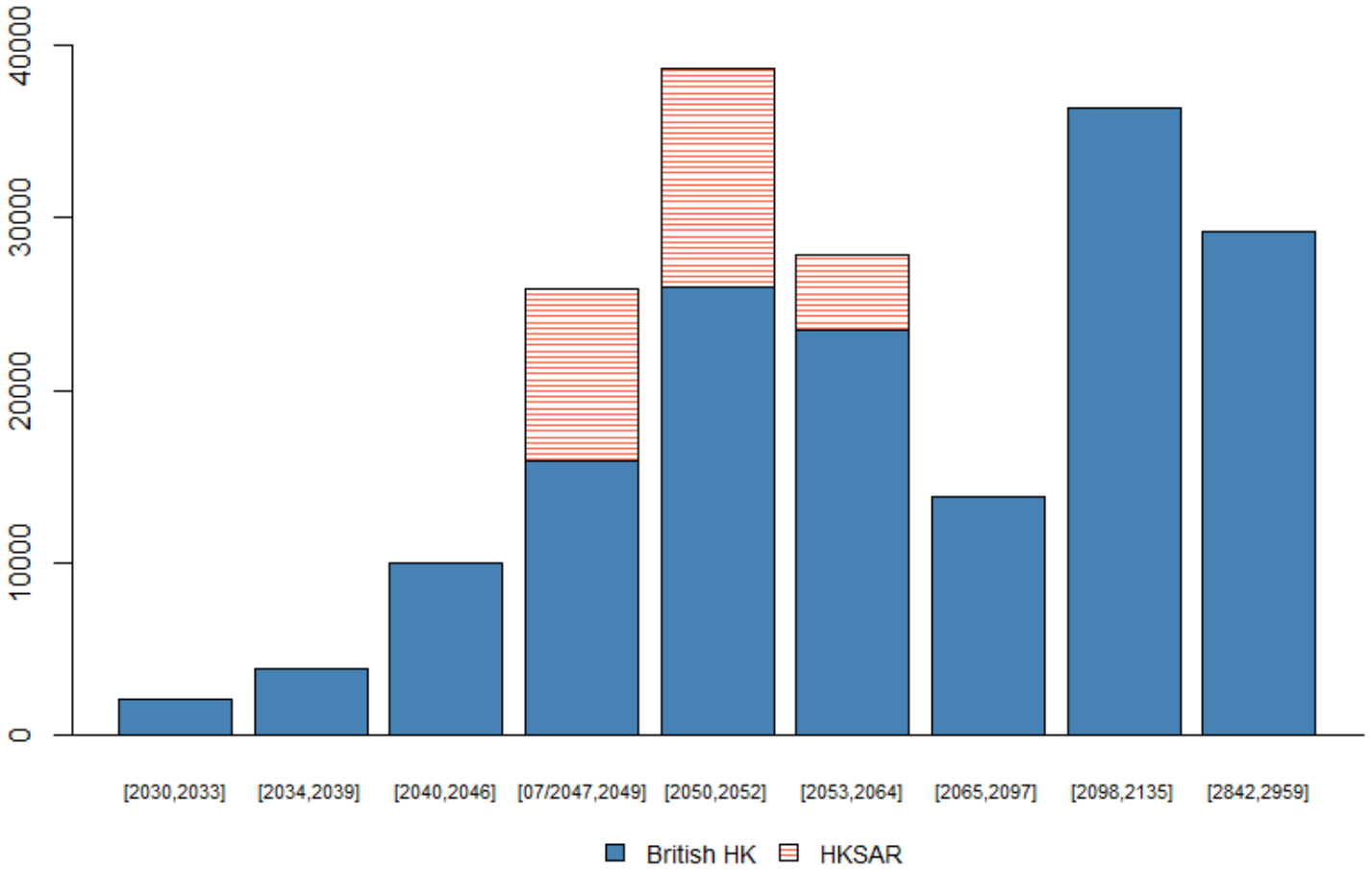
Dep Var	Log (Unit Price)		Log (Total Price)	
I(2030 ≤ Lease ≤ 2033)	-0.057	-0.054	-0.043	-0.043
	[0.043]	[0.045]	[0.046]	[0.046]
I(2034 ≤ Lease ≤ 2039)	-0.038	0.002	-0.042	0.001
	[0.039]	[0.038]	[0.042]	[0.041]
I(2040 ≤ Lease ≤ 2046)	-0.024	-0.009	-0.013	0.001
	[0.057]	[0.056]	[0.060]	[0.058]
I(7/1/2047 ≤ Lease ≤ 2049)	-0.141***	-0.124***	-0.149***	-0.128***
	[0.028]	[0.026]	[0.029]	[0.027]
I(2050 ≤ Lease ≤ 2052)	-0.127***	-0.121***	-0.127***	-0.120***
	[0.028]	[0.027]	[0.030]	[0.028]
I(2053 ≤ Lease ≤ 2064)	-0.127***	-0.090***	-0.130***	-0.090***
	[0.032]	[0.028]	[0.033]	[0.029]
I(2065 ≤ Lease ≤ 2097)	-0.105***	-0.090***	-0.107**	-0.091**
	[0.035]	[0.033]	[0.043]	[0.040]
I(2098 ≤ Lease ≤ 2135)	-0.022	-0.014	-0.029	-0.019
	[0.039]	[0.035]	[0.040]	[0.036]
I(2842 ≤ Lease ≤ 2959)	-0.052	-0.034	-0.054	-0.034
	[0.035]	[0.034]	[0.038]	[0.036]
Property Attributes	Yes	No	Yes	No
Property Attributes × Year	No	Yes	No	Yes
District × Month FE	Yes	Yes	Yes	Yes
Adj R^2	0.9288	0.9405	0.9421	0.9509
N	551,790	551,790	551,790	551,790

A More Exogenous Control Group: Historical Treaty

- A finer control group: leases located in New Kowloon and New Territories that were granted after Second Convention of Peking in 1898.

Dep Var	Log (Unit Price)		Log (Total Price)	
.....				
I(Lease = 6/30/2047 & After JD)	0.025	0.025	0.024	0.025
	[0.019]	[0.019]	[0.020]	[0.020]
I(Lease = 6/30/2047 & Before JD and in HKL+KIL)		0.005		0.014
		[0.037]		[0.040]
I(7/1/2047 $\leq$ Lease $\leq$ 2049)	-0.134***	-0.132***	-0.141***	-0.137***
	[0.028]	[0.032]	[0.030]	[0.033]
I(2050 $\leq$ Lease $\leq$ 2052)	-0.123***	-0.122***	-0.123***	-0.120***
	[0.028]	[0.030]	[0.030]	[0.031]
I(2053 $\leq$ Lease $\leq$ 2064)	-0.124***	-0.122***	-0.126***	-0.122***
	[0.032]	[0.035]	[0.034]	[0.036]
.....				
Property Attributes	Yes	Yes	Yes	Yes
District $\times$ Month	Yes	Yes	Yes	Yes
N	551,790	551,790	551,790	551,790
Adj R^2	0.9289	0.9289	0.9422	0.9422

Transactions by Lease Groups: HKSAR vs British



- Treatment groups only. HKSAR leases only show up in groups ranging 2047-2064

Reneging Risk: Empirical Motivation

Dep Var	Log (Unit Price)		Log (Total Price)	
	.....			
I(7/1/2047 ≤ Lease ≤ 2049)	-0.168***	-0.148***	-0.176***	-0.152***
	[0.029]	[0.026]	[0.030]	[0.027]
I(2050 ≤ Lease ≤ 2052)	-0.150***	-0.141***	-0.151***	-0.141***
	[0.030]	[0.028]	[0.032]	[0.029]
I(2053 ≤ Lease ≤ 2064)	-0.135***	-0.097***	-0.138***	-0.097***
	[0.032]	[0.027]	[0.033]	[0.028]
I(7/1/2047 ≤ Lease ≤ 2064) × I (HKSAR leases)	0.085***	0.074***	0.088***	0.075***
	[0.027]	[0.025]	[0.028]	[0.026]
	.....			
Property Attributes	Yes	No	Yes	No
Property Attributes × Year	No	Yes	No	Yes
District × Month FE	Yes	Yes	Yes	Yes
Adj R^2	0.9294	0.9409	0.9425	0.9511
N	551,790	551,790	551,790	551,790

- A premium of 7–8 pp of HKSAR leases relative to British HK leases (half of base effect).

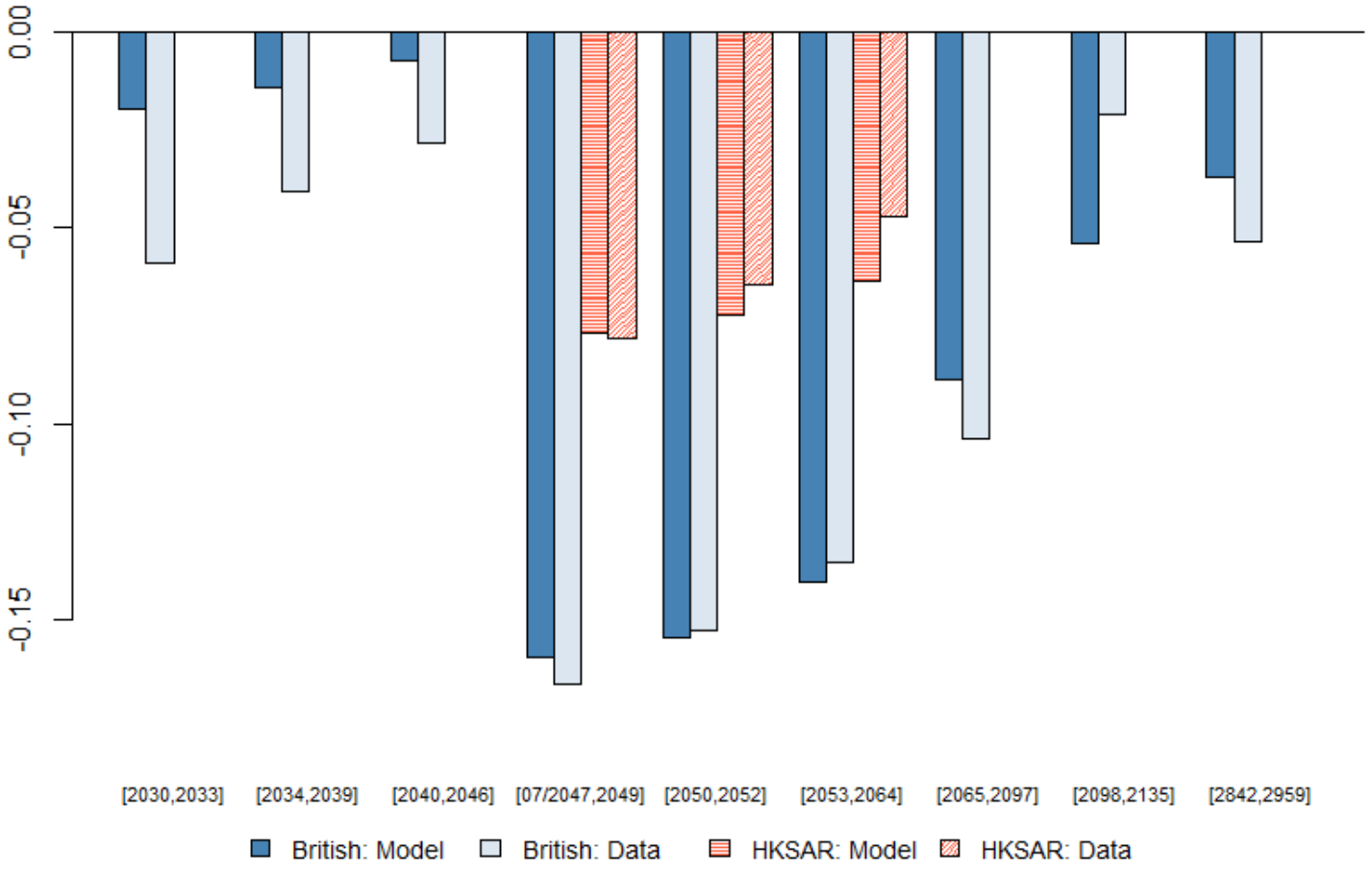
Reneging Risk: Model Extension

- No official arrangements beyond 2047 regarding colonial leases (say those 999-year ones)
  - Land Resumption Ordinance: land requisition for public purposes?
- Reneging shock is i.i.d. across all properties with British Hong Kong leases; emerge only after July 1st, 2047.
  - $\lambda > 0$: the intensity of reneging shock
  - $\delta \in (0,1)$: the extra land premium facing by colonial leases
- House value with a British land leases ($\kappa = r - g$):

$$P(L;\tau,Brit) = E\left[\int_0^{L\wedge\mathcal{T}} e^{-\kappa s}ds + e^{-\kappa(L\wedge\mathcal{T})}\cdot(1-\delta)\cdot P(L\wedge\mathcal{T}+50;HK)\right]$$

  - Reneging event $\mathcal{T}$ (Poisson arrival) with intensity $\lambda \mathbf{1}_{\{s\geq\tau\}}$;
  - $P(L\wedge\mathcal{T}+50;HK)$ is a standard 50-year Hong Kong land lease after expiation or reneging (whichever comes the first, $L\wedge\mathcal{T}\equiv\min(L,\mathcal{T})$)

Calibrated Model



- Calibrate $\kappa = r - g$, estimate $\{\gamma, \lambda, \delta\}$ that minimize the difference between model & data

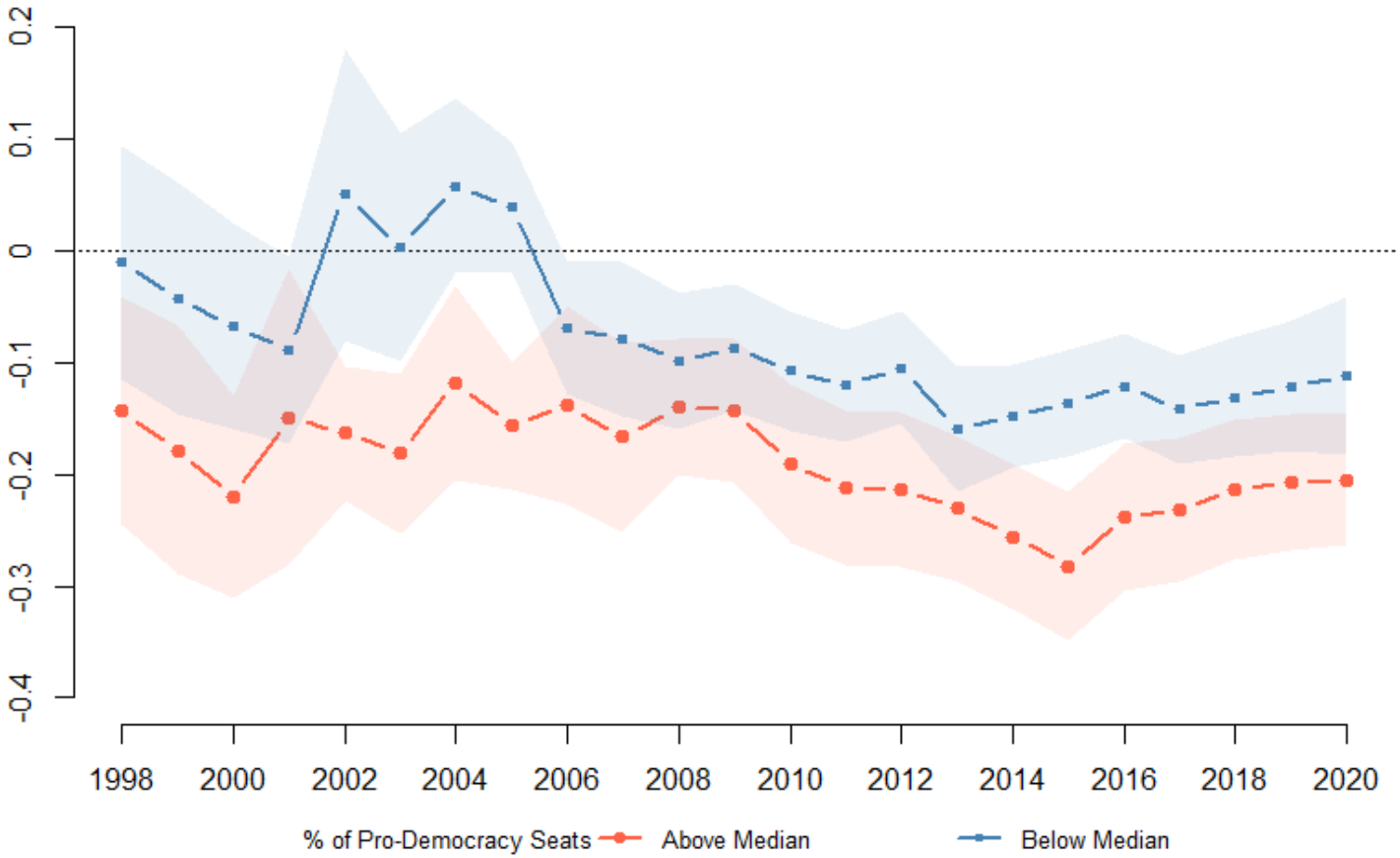
Model Implications

- $\hat{\gamma} = 25.37\%$: after 2047 HK homeowners expect an about 25% of penalty in order to extend their land leases 2047.
- British HK leases are expected to
  - be reneged every 73 years ($\hat{\lambda} = 1.37\%$);
  - need to pay a penalty (called premium) of about $\hat{\delta} = 13.08\%$ of the house value upon receiving a 50-year HKSAR-style renewal contract.
- All of them are under risk neutral measure.
- Relative to an otherwise identical 50-year HKSAR contract, a hypothetical 50-year British HK lease has a price discount of 11.1%.

Citywide Sentiments and the Price Discounts

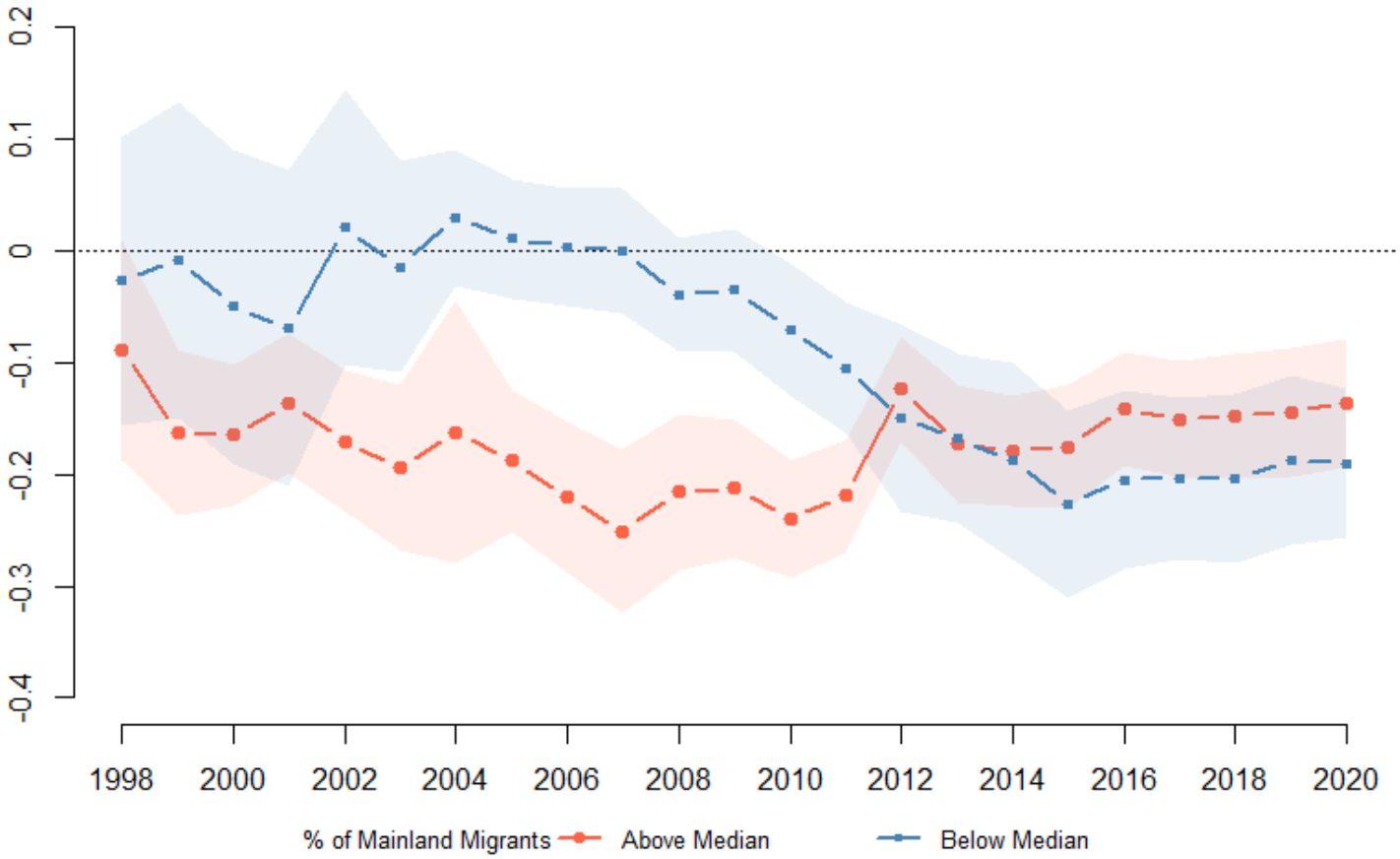
- As confidence in Hong Kong's future declines, the political uncertainty discount in the housing market climbs.

Local Sentiment: Cross-sectional versus Time Variation



- In districts with greater local sentiment we observe a significant price discount even before 2005, different from the overall results as well as those for other districts.

Local Sentiment: Cross-sectional versus Time Variation



- Similar and consistent results.

Interpretation: Plausible Social and Economic Mechanisms

- Percentage of pro-democracy seats
  - Residents in places more likely to support pro-democratic camps
  - Therefore more uncertain over the future of Hong Kong and “One Country, Two Systems."
- Percentage of mainland migrants
  - Hong Kongers have grown increasingly fearful of losing their own identity.
  - In places where more mainland residents are present and where the cultural differences between Hong Kongers and mainlanders are on full display, local residents tend to see their lives as more affected by the mainland.

Conclusion

- Study long-term property rights under political uncertainty, as the housing value depends on the continuity of land ownership in the far future.
- A reduced-form regression guided by a pricing model of housing assets with future political uncertainty
  - Further extended to incorporate a reneging risk specifically to colonial land contracts
  - Implies a price discount of 11.1% from today's viewpoint in a hypothetical 50-year British Hong Kong lease.
- Citywide and district-level political uncertainty measures, further empirical support to our mechanism.

Appendix: Model Illustration

- If $L < \tau$ and $L + T \geq \tau$, the homeowner can extend the land lease to $L + T$ before the uncertainty resolution date τ, implying that

$$P(L;\tau) = \int_0^{L+T} e^{-\kappa s} ds + \int_{L+T}^{\infty} e^{-\kappa s} (1-\gamma) ds = \frac{1-\gamma e^{-\kappa(L+T)}}{\kappa}.$$

- In contrast, if $L \geq \tau$, then the house value is

$$P(L;\tau) = \int_0^{L} e^{-\kappa s} ds + \int_{L}^{\infty} e^{-\kappa s} (1-\gamma) ds = \frac{1-\gamma e^{-\kappa L}}{\kappa}.$$

References

Baker, Scott R., Nicholas Bloom, and Steven J. Davis, 2016, Measuring Economic Policy Uncertainty, *The Quarterly Journal of Economics* 131, 1593–1636.

Hassan, Tarek A., Stephan Hollander, Laurence van Lent, and Ahmed Tahoun, 2019, Firm-Level Political Risk: Measurement and Effects, *The Quarterly Journal of Economics* 134, 2135–2202.

Pástor, Ľuboš, and Pietro Veronesi, 2013, Political Uncertainty and Risk Premia, *Journal of Financial Economics* 110, 520–545.

Rosen, Sherwin, 1974, Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition, *The Journal of Political Economy* 82, 34–55.