

Valuing Long-Term Property Rights with Anticipated Political Regime Shifts

Zhiguo He,¹ Maggie Hu,² Zhenping Wang,³ and Vincent Yao⁴

¹University of Chicago and NBER

²Chinese University of Hong Kong

³University of Chicago

⁴Georgia State University

Chinese University of Hong Kong, August 2023

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, 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: isolating variation in the political uncertainty from fundamentals.
- The impending uncertainty of Hong Kong's political outlook is centered around a predetermined future date (July 1st, 2047).
- Identify exposure to political risk by exploiting a unique 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 HKSAR) have been promised a 50-year extension protection; those expiring immediately after that date are left unprotected largely.
 - How are these long-term promises (on land policies) perceived by the market?

Outline

- ① Motivation and Institutional Background
- ② Main Analysis
 - Model Framework and Assumption
 - Data and Baseline Analysis
 - Reneging Risk (HKSAR vs British HK)
 - Estimated Model and Economic Magnitude
- ③ Political Uncertainty: District-Level Evidence
- ④ Conclusions

A Brief History of Hong Kong: Before the Handover

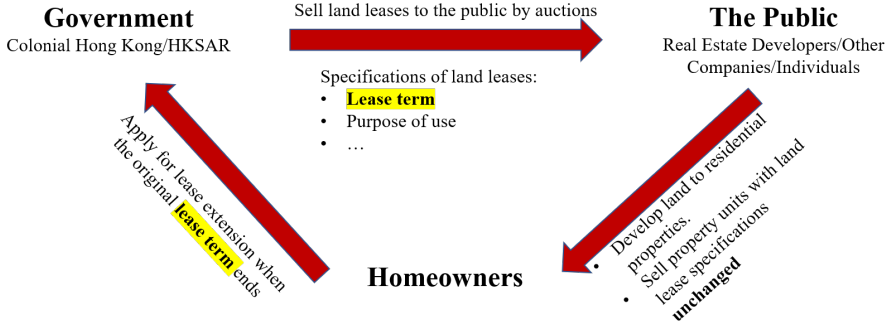
- 1st, 2nd Opium Wars in 1841, 1860: British forced Qing China to cede Hong Kong Island
- British forced the Second Convention of Peking (1898), leasing New Territories to Britain for 99 years until June 30th, 1997
- The Sino-British Joint Declaration (JD), ratified on May 27th, 1985, lays out the groundwork for the handover
- The Basic Law, as the de facto constitution, established in 1990



A Brief History of Hong Kong: After the Handover

- Hong Kong has experienced significant changes in all aspects of society
 - In 1997 GDP: Hong Kong 18% of China (now only 2.5%)
 - Many (Trump) believed “Hong Kong was a glimpse into China’s future”
- While the Basic Law guarantees a high degree of autonomy, concerns over Beijing’s interference have been present and intensified over the years
- Two 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

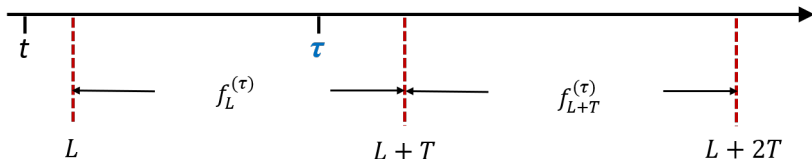


Land Leases in Hong Kong

- A house generates a “natural” cash-flow \hat{R}_t growing at g , $\hat{R}_t = \frac{e^{gt}}{1-\omega}$.
 - ω is the percentage of repairing costs and tax, including 3% current baseline *ground rent* (like **tax**), so the current effective cash-flow $R_t = e^{gt}$.
 - But, possible *extra ground rent* $f_s^{(\tau)}$ imposed by the government on the **renewal** date, e.g.

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

- Renewal date L , lease extension term $T = 50$ (T exogenous).



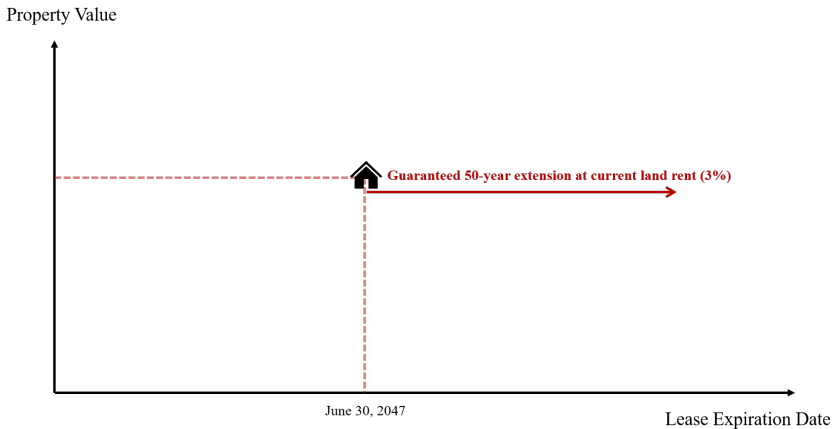
Government Renewal Decisions

- Regrant or extend non-renewable leases upon their expiry;
- So far, the HKSAR has kept offering 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 (a lump sum payment) at extension;
 - This statement is explicitly mentioned in all official documents
 - Summarized by potential increase of ground rent in the model

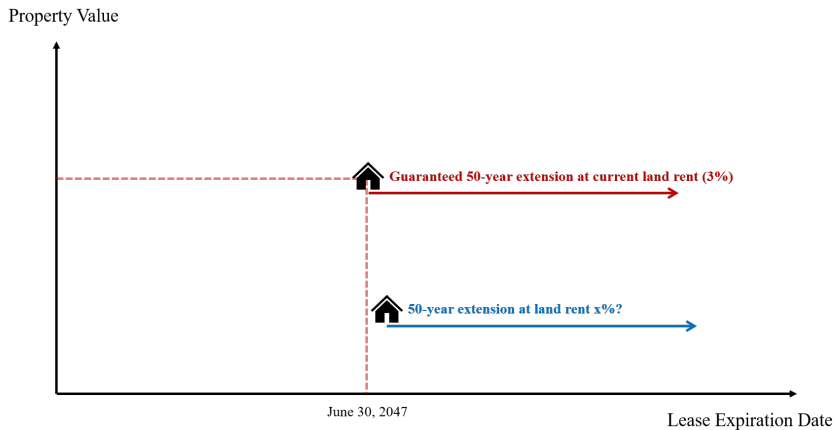
Political Uncertainty Regarding the Renewal/Regrants

- 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 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.”*
- Neither clarity nor guarantee to leases expiring after June 30th, 2047
 - Ground rent could be raised to 25% for leases expiring on Jan. 1st, 2050
- We first derive model implications based on the HKSAR’s announcement, and later “let data speak”

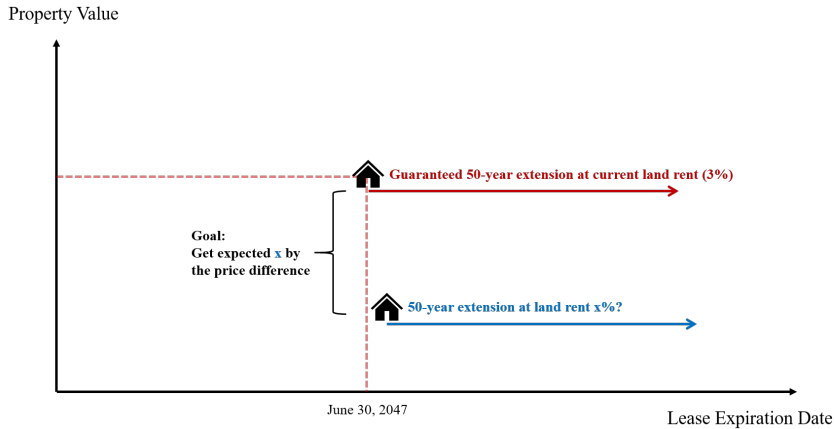
Model: Illustrating Examples of House Price



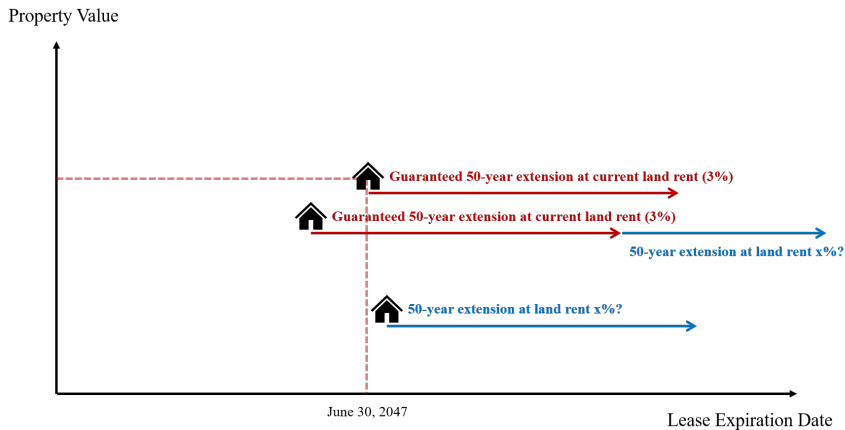
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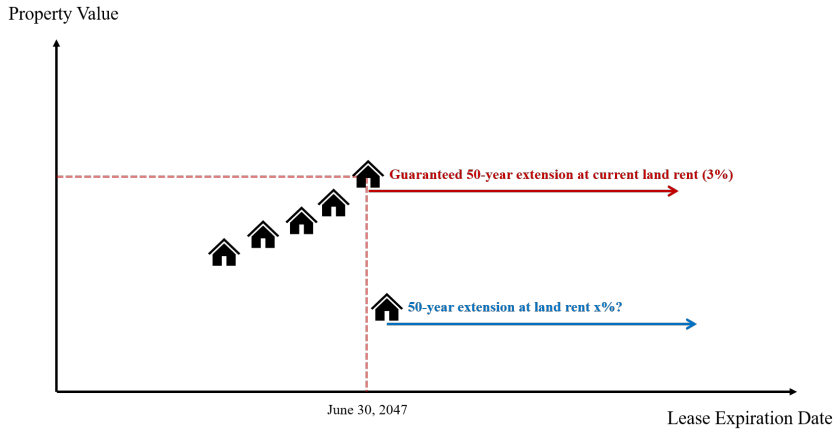
Model: Illustrating Examples of House Price



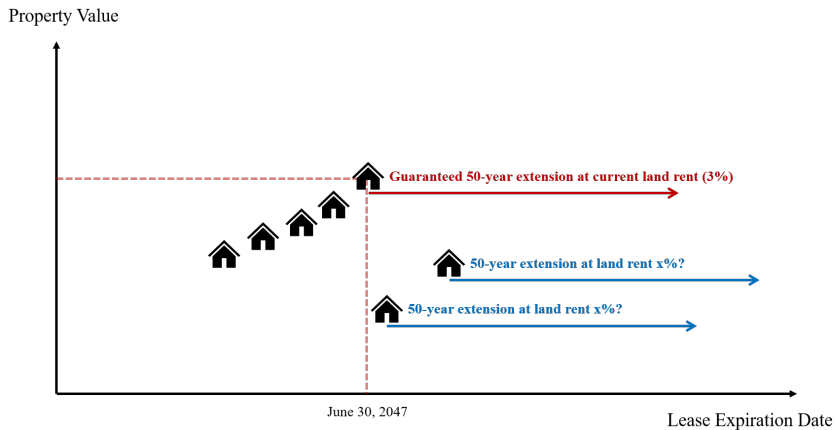
Model: Illustrating Examples of House Price



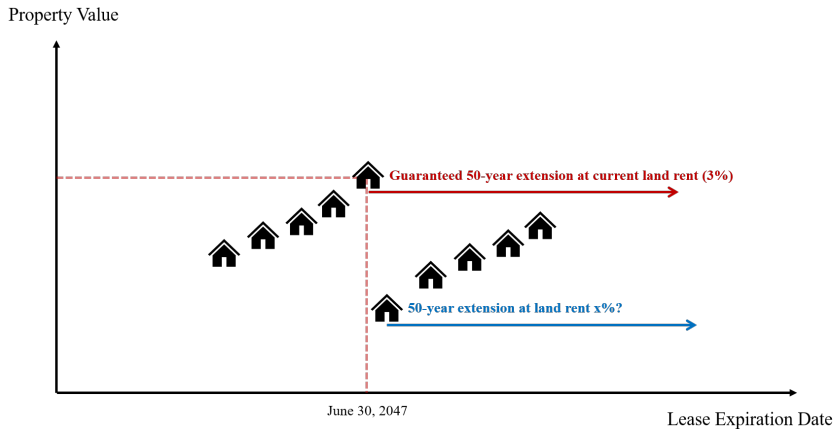
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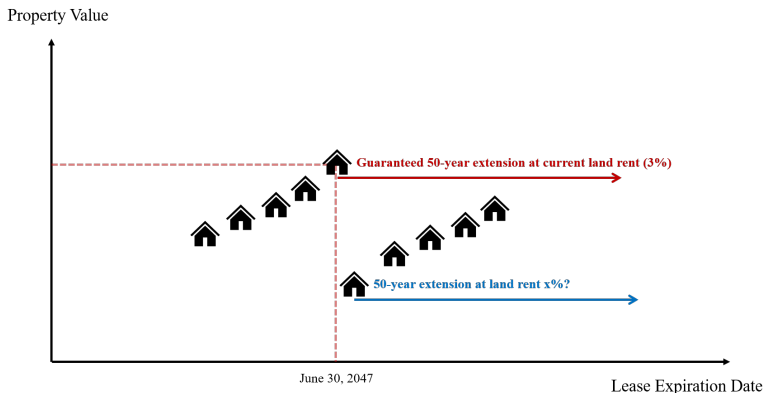
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Model: Illustrating Examples of House Price

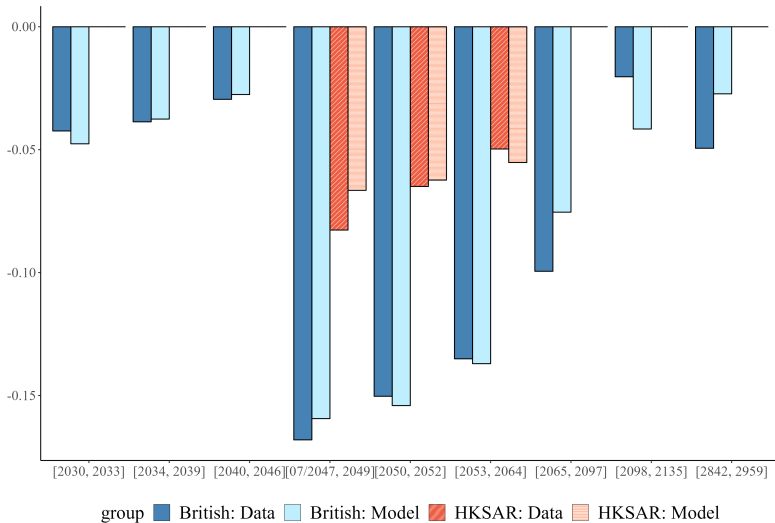


- **Key premise:** the 50-year renewal commitment made by HKSAR before 2047—but in effect beyond 2047—will be (more likely) honored by the new post-2047 HK government
 - “Policy continuity” in previous negotiations b/w UK, China, and HK

Discussion of Key Model Assumptions

- We assume the extension decisions made by the HKSAR before 2047 at year n but in effect beyond 2047 (up to $n + 50$) will be honored by the new government in Hong Kong, despite the expiration of the HKSAR government on July 1st, 2047.
- It is uncertain whether the leases granted by HKSAR will be respected in the event of the failure of the "Country, Two Systems". However, our analyses remain valid in such a scenario.
 - Our key prediction of a price discount at $L=\tau$ only requires a differential treatment by the new regime (in power after 2047) with respect to the land leases that have already been promised by HKSAR versus those that have not.

Results Preview: Data and Model



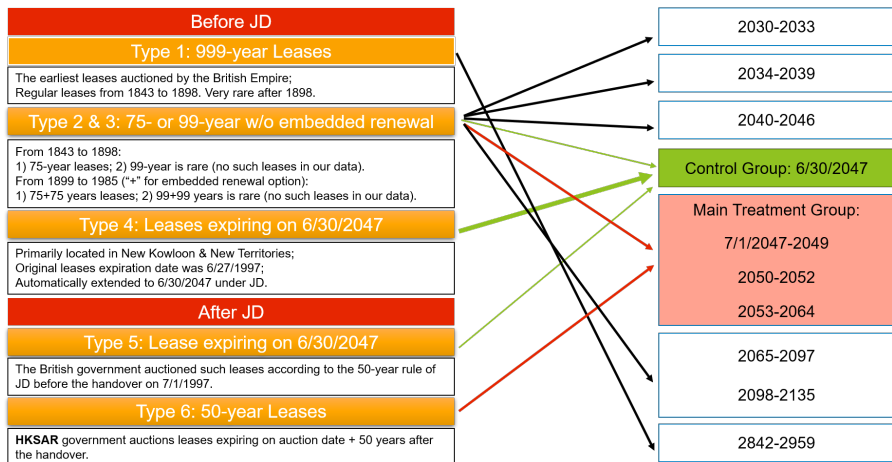
Data

- 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 \neq building age. Mean (median) of building age in HK at the time of sale: 16(15) years

Summary Statistics

Variable	N	Mean	SD	Min	1 st	5 th	Median	95 th	99 th	Max
Log(Price)	551,790	1.03	0.65	-0.41	-0.24	0.00	0.99	2.13	2.53	2.82
Log(Unit Price)	551,790	8.62	0.54	7.44	7.57	7.78	8.57	9.56	9.77	9.90
Building Age	551,790	16.01	9.03	2	2	3	15	32	38	40
Building Completion Year	551,790	1992	8.98	1959	1972	1978	1992	2006	2012	2018
Net Living Area Area	551,790	528.57	163.80	258	277	306	504	852	1,043	1,157
Floor	551,790	18	12	0	1	3	16	41	56	80
No of Bedrooms	526,155	2	1	0	0	0	2	3	3	4
No of Living Rooms	530,719	2	1	0	0	0	2	2	2	4
Bay Window Size	551,790	20.32	15.37	0	0	0	22	44	54	250
Distance To MRT	551,790	702	886	8	24	59	423	2,462	4,708	10,633
Distance To Bus Stop	551,790	314	276	8	12	48	258	711	1,312	3,365
Distance To Hospital	551,790	1,644	1,268	80	251	394	1,359	3,978	6,565	10,589
Distance To School	551,790	138	196	0	5	22	101	303	946	2,526
Distance To University	551,790	3,564	2,466	85	309	611	3,022	8,348	10,311	10,311
Distance To Coastal Line	551,790	1,358	1,635	17	31	72	732	5,441	7,338	8,227

Empirical Identification



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

Baseline Estimates

	Dep Var: Log(Unit Price)				
	(1)	(2)	(3)	(4)	(5)
I(2030 ≤ Lease ≤ 2033)	-0.067 (0.041)	0.032 (0.036)	-0.057 (0.043)	-0.054 (0.053)	0.056 (0.034)
I(2034 ≤ Lease ≤ 2039)	-0.057 (0.038)	-0.076** (0.030)	-0.038 (0.038)	0.002 (0.038)	-0.058** (0.029)
I(2040 ≤ Lease ≤ 2046)	-0.054 (0.053)	-0.088** (0.042)	-0.024 (0.057)	-0.009 (0.056)	-0.051 (0.047)
I(7/1/2047 ≤ Lease ≤ 2049)	-0.146*** (0.028)	-0.123*** (0.025)	-0.141*** (0.028)	-0.124*** (0.026)	-0.116*** (0.023)
I(2050 ≤ Lease ≤ 2052)	-0.134*** (0.028)	-0.102*** (0.025)	-0.127*** (0.028)	-0.121*** (0.027)	-0.092*** (0.024)
I(2053 ≤ Lease ≤ 2064)	-0.139*** (0.033)	-0.099*** (0.030)	-0.127*** (0.032)	-0.090*** (0.028)	-0.089*** (0.028)
I(2065 ≤ Lease ≤ 2097)	-0.123*** (0.035)	-0.095*** (0.031)	-0.105*** (0.035)	-0.090*** (0.034)	-0.082*** (0.030)
I(2098 ≤ Lease ≤ 2135)	-0.039 (0.038)	-0.007 (0.028)	-0.022 (0.038)	-0.014 (0.037)	0.014 (0.027)
I(2842 ≤ Lease ≤ 2959)	-0.075** (0.035)	-0.087*** (0.026)	-0.052 (0.035)	-0.034 (0.035)	-0.061** (0.026)
Property Attributes	Yes	Yes	Yes		Yes
Property Attributes × Year				Yes	
District + Month FE	Yes				
Subdistrict + Month FE		Yes			
District × Month FE			Yes	Yes	
Subdistrict × Month FE					Yes
N	551,790	551,790	551,790	551,790	551,790
Adjusted R ²	0.919	0.930	0.929	0.941	0.943

Robustness: Covariate Balance Tests

- One potential concern with our identification strategy is that **leases are unlikely to be randomly assigned due to the expiration date of HKSAR.**
- To examine covariate balance, we estimate regressions of each property attribute on an indicator for the main treatment group.
 - Overall good balance: Most structural characteristics and amenities are not significantly different between the two groups.
 - Except for building age, building completion year, and floor.
- Matched sample approach: Pairing each estate in the main treatment group with the nearest estate in the control group and matching properties within each estate pair to have similar age and other characteristics using both manual criteria and propensity score matching (PSM) procedure.

Matching Procedures

Covariate Balance Regressions and Summary Stats

	Regressions				Summary Stats			
	Main Sample		Matched Sample		Main Sample		Matched Sample	
	Dep Var: Covariate				Main	Control	Main	Control
	Indep Var: I(Main Treatment Group)				Treatment		Treatment	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log(Unit Price)	0.436*** (0.048)	0.029 (0.030)	-0.018 (0.120)	-0.071** (0.033)	8.946 (0.507)	8.510 (0.525)	8.822 (0.498)	8.840 (0.509)
Building Age	-6.979*** (1.167)	-9.281*** (1.253)	-0.074 (1.176)	-0.627 (0.402)	9.461 (8.016)	16.44 (8.412)	9.132 (6.294)	9.187 (6.407)
Net Living Area	37.67* (19.41)	10.89 (17.75)	-8.626 (33.82)	-3.685 (14.73)	551.5 (162.1)	513.8 (157.0)	537.1 (125.2)	535.0 (121.9)
Floor	7.084*** (1.365)	6.136*** (1.269)	-1.912 (4.107)	-1.553 (1.414)	24.06 (15.90)	16.98 (10.96)	24.88 (16.19)	25.92 (16.01)
No. of Bedrooms	0.000 (0.096)	0.002 (0.087)	0.015 (0.150)	0.015 (0.063)	2.056 (0.977)	2.056 (0.983)	2.097 (0.871)	2.031 (0.807)
No. of Living Rooms	0.140* (0.074)	0.115* (0.064)	-0.055 (0.122)	-0.027 (0.034)	1.750 (0.711)	1.610 (0.766)	1.802 (0.644)	1.792 (0.691)
Bldg Completion Year	10.58*** (1.362)	9.281*** (1.253)	0.720 (0.938)	0.627 (0.402)	2002 (8.855)	1991 (7.305)	2002 (4.306)	2000 (4.066)
.....							
District × Month FE		Yes						
Estate Pair × Month FE				Yes				
N	456,330	456,330	29,310	29,310	92,407	363,923	14,655	14,655

Robustness: Alternative Fixed Effects and Matched Sample

- Properties with leases expiring between July 1st, 2047, and 2064 sell at a discount of 11-18%.
 - Sample includes transactions from both the control and main treatment lease groups.
 - Control for different **progressively tightened location fixed effects** in each column.
 - A matched sample approach that **pairs adjacent estates with similar characteristics**.

Dep Var	Log(Unit Price)				
	Main Treatment + Control Leases				Matched Sample
Sample	(1)	(2)	(3)	(4)	(5)
I(Main Treatment Group)	-0.133*** (0.021)	-0.117*** (0.020)	-0.111*** (0.020)	-0.110*** (0.019)	-0.180*** (0.031)
Property Attributes	Yes		Yes	Yes	Yes
Property Attributes × Year		Yes			
District × Month FE	Yes	Yes			
Subdistrict × Month FE			Yes		
Subdistrict Grid × Month FE				Yes	
Estate Pair × Month FE					Yes
<i>N</i>	456,330	456,330	456,330	456,330	29,310
Adjusted R ²	0.936	0.947	0.946	0.958	0.980

Robustness: A More Exogenous Control Group (Historical Treaty)

- Separate control group into three subgroups: 1) I(lease = 6/30/2047 & After JD); 2) I(lease = 6/30/2047 & Before JD and in (HKL, KIL)); 3) leases granted before the JD and located in New Kowloon and New Territories (served as the control group).

Dep Var	Log(Unit Price)	
	(1)	(2)
I(Lease=6/30/2047 & After JD)	0.028 (0.019)	0.029 (0.019)
I(Lease=6/30/2047 & Before JD and in HKL+KIL)	0.023 (0.033)	0.032 (0.032)
I(7/1/2047 ≤ Lease ≤ 2049)	-0.128*** (0.032)	-0.108*** (0.030)
I(2050 ≤ Lease ≤ 2052)	-0.114*** (0.030)	-0.106*** (0.028)
I(2053 ≤ Lease ≤ 2064)	-0.114*** (0.036)	-0.073** (0.032)
.....		
Property Attributes	Yes	
Property Attributes × Year		Yes
District × Month FE	Yes	
N	551,790	551,790
Adjusted R ²	0.929	0.941

Robustness: Placebo Test using Rental Prices

- Collect rental data from Nov 2018 to Feb 2020 on Centaline Property website
- The consumption values based on rental prices of properties in the main treatment and control groups are very similar.
- A **substantial price differential** between HKSAR versus colonial British leases.

Dep Var	Log(Unit Rent)		Log(Unit Price)			
	Rentals		Sales			
	11/2018-2/2020		All Years		11/2018-2/2020	
Sample	(1)	(2)	(3)	(4)	(5)	(6)
I(Main Treatment Group)	-0.004 (0.017)	-0.009 (0.017)	-0.133*** (0.021)	-0.153*** (0.022)	-0.088*** (0.027)	-0.101*** (0.028)
× I(HKSAR Lease)		0.016 (0.011)		0.076*** (0.025)		0.053** (0.018)
Property Attributes	Yes	Yes	Yes	Yes	Yes	Yes
District × Month FE	Yes	Yes	Yes	Yes	Yes	Yes
<i>N</i>	17,464	17,464	456,330	456,330	14,942	14,942
Adjusted R ²	0.809	0.809	0.933	0.934	0.748	0.751

Renewing Risk: Empirical Motivation

Dep Var	Log(Unit Price)				
	(1)	(2)	(3)	(4)	(5)
				
I(7/1/2047 ≤ Lease ≤ 2049)	-0.172*** (0.028)	-0.147*** (0.024)	-0.168*** (0.028)	-0.148*** (0.026)	-0.139*** (0.023)
				
I(Main Treatment Group) × I(HKSAR Lease)	0.080*** (0.027)	0.075*** (0.022)	0.085*** (0.027)	0.074*** (0.025)	0.076*** (0.021)
Property Attributes	Yes	Yes	Yes		Yes
Property Attributes × Year				Yes	
District + Month FE	Yes				
Subdistrict + Month FE		Yes			
District × Month FE			Yes	Yes	
Subdistrict × Month FE					Yes
<i>N</i>	551,790	551,790	551,790	551,790	551,790
Adjusted R ²	0.920	0.931	0.929	0.941	0.943

- A premium of 8.5% of HKSAR leases relative to British HK leases (half of base effect).

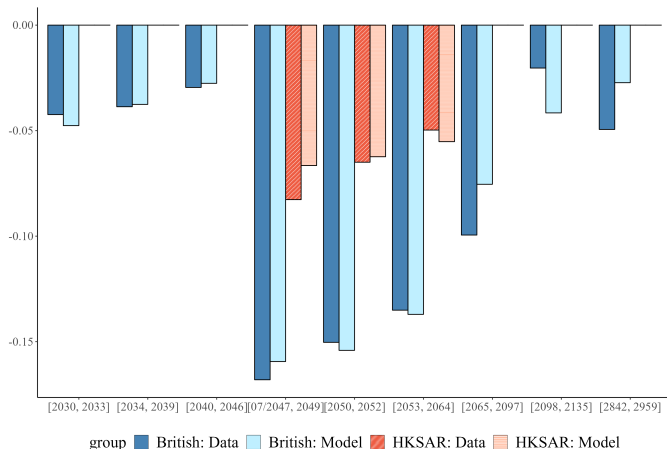
Reneging Risk: Model Extension

- No official arrangements beyond 2047 regarding colonial leases
 - e.g., those 999-year ones
 - Land Resumption Ordinance: land requisition for public purposes
- Reneging shock is i.i.d. across all properties with **colonial British** leases:
 - Reneging intensity: $\lambda^{pre} \mathbf{1}_{s < \tau} + \lambda^{post} \mathbf{1}_{s \geq \tau}$
 - Extra land premium charge: $\delta^{pre} \mathbf{1}_{s < \tau} + \delta^{post} \mathbf{1}_{s \geq \tau}$
 - We later consider the possibility of reneging on HKSAR leases
- House value with a British land leases ($\kappa = r - g$):

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

- Reneging event \mathcal{T} (Poisson arrival) with intensity $\lambda^{pre} \mathbf{1}_{s < \tau} + \lambda^{post} \mathbf{1}_{s \geq \tau}$;
- $P(L \wedge \mathcal{T} + 50; HK)$: value of a standard 50-year HKSAR leases standing at $L \wedge \mathcal{T} \equiv \min(L, \mathcal{T})$

Estimation: Data and Model



- Calibrate $\kappa = r - g = (1 - \text{Expense Ratio}) \times \text{Gross Rental Yield} = 72\% \times 2\% = 1.44\%$, estimate $\{\gamma, \lambda^{pre}, \lambda^{post}, \delta^{pre}, \delta^{post}\}$ that minimize the difference between model & data

2-Step GMM Estimation of Model Parameters

	Base	Extension	Base: Alternative κ			
Gross Rental Yield	2.00%	2.00%	1.00%	3.00%	4.00%	5.00%
Net Rental Yield (κ)	1.44%	1.44%	0.72%	2.16%	2.88%	3.60%
	(1)	(2)	(3)	(4)	(5)	(6)
Reneging Risk						
λ^{Pre}	0.000	0.000	0.000	0.000	0.004	0.009**
	[0.004]	[0.019]	[0.003]	[0.004]	[0.004]	[0.005]
λ^{Post}	0.016***	0.019***	0.015***	0.020***	0.019***	0.017***
	[0.003]	[0.003]	[0.002]	[0.004]	[0.004]	[0.004]
Extra Land Premium						
δ_{HK}^{Pre}		0.017				
		[0.047]				
δ^{Pre}	0.062***	0.075***	0.040***	0.088***	0.106***	0.119***
	[0.007]	[0.026]	[0.005]	[0.011]	[0.014]	[0.018]
δ^{Post}	0.208***	0.217**	0.127***	0.312***	0.504***	0.835***
	[0.022]	[0.104]	[0.012]	[0.029]	[0.056]	[0.116]
Additional Ground Rent Rate						
γ	0.210***	0.237	0.272***	0.214***	0.245***	0.296***
	[0.008]	[0.197]	[0.008]	[0.008]	[0.010]	[0.012]
N	551,790	551,790	551,790	551,790	551,790	551,790

Model Implications

- $\hat{\gamma} = 21\%$: HK homeowners expect an about 21% of penalty in order to extend their land leases after 2047.
- British HK leases, if expiry date is
 - Before 2047: no renewing risk ($\hat{\lambda}^{pre} = 0$) but need to pay a penalty (called premium) of about $\hat{\delta}_{pre} = 6.2\%$ of house value upon lease renewal;
 - After 2047: $\hat{\lambda}^{post} = 1.6\%$ (renege every 62 (=1/1.6%) years after 2047),
 $\hat{\delta}_{post} = 20.8\%$
- Suppose there are two identical 50-year British vs. HKSAR leases
 - Standing at Jan 1st, 2023, a property with a British lease is traded at an effective price discount of 9.83% relative to the HKSAR one.

Economic Magnitude of γ : What does It Capture?

- $\hat{\gamma} \approx 21\%$ captures the overall effect of regime change, relatively clean identification
- Though, estimated discount, and hence γ , might reflect both
 - **Increasing ground rent/premium;**
 - **Endogenous reaction from homeowners** (say, lack of maintenance): Homeowners may choose to do less maintenance due to expected tax hikes following the new political regime.
- Analyze interactive effect with age, using an indicator of old (≥ 6 years) buildings:
 - Old properties sold at an additional discount of **3.6 percentage points**, relative to young ones in the main treatment group with a **10.5%** price discount.
 - **HKSAR leases**: Old properties in the main treatment group have an additional **2.6%** discount relative to young ones (but statistically insignificant).
 - **British leases**: Young and old properties in the main treatment group show significantly higher discounts of **7.8%** and **10.7%**, respectively, relative to HKSAR young ones.

Colonial British Leases and Maintenance

Dep Var Sample	Log(Unit Price)			Log(Unit Rent)		
	All Sales			Rentals		
	(1)	(2)	(3)	(4)	(5)	(6)
I(Main Treatment Group)	-0.105*** (0.025)	-0.072** (0.029)	-0.053 (0.034)	0.003 (0.017)	0.001 (0.020)	-0.006 (0.022)
× I(Age ≥ 6)	-0.036** (0.015)			-0.009 (0.016)		
× I(British Leases)		-0.082*** (0.026)			-0.015 (0.011)	
× I(HKSAR Lease & Age ≥ 6)			-0.026 (0.020)			0.020 (0.023)
× I(British Lease & Age < 6)			-0.078** [0.031]			0.008 [0.018]
× I(British Lease & Age ≥ 6)			-0.107*** (0.031)			-0.009 (0.020)
Property Attributes	Yes	Yes	Yes	Yes	Yes	Yes
District × Month FE	Yes	Yes	Yes	Yes	Yes	Yes
<i>N</i>	551,790	551,790	551,790	19,435	19,435	19,435
Adjusted <i>R</i> ²	0.929	0.929	0.929	0.803	0.803	0.804

Economic Magnitude of γ : International Comparison

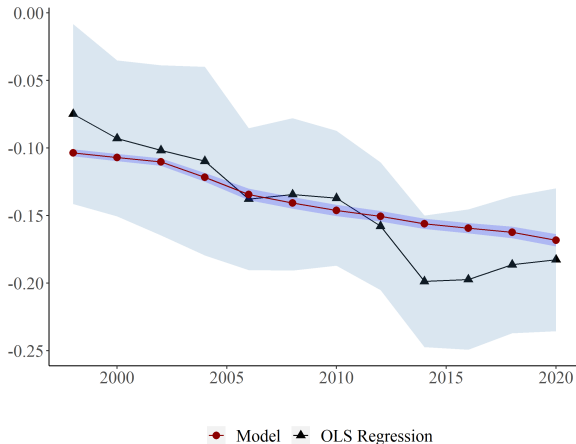
- Leasehold Land Tenure System (e.g., UK and former British colonies)
 - Hong Kong (now): ground rent (3%) + rates (5%) → 8% of gross rent
 - After 2047: HK homeowners pay 21% higher ground rent rate to extend their land leases. Is the 21% additional ground rent plausible?
 - **U.K.:** 100% of net rent; essentially buying a new lease at the market price
 - **Singapore:** 100% of land premium; “Structure” premium is waived since 2008
 - Is it reasonable from the perspective of **mainland China**?
 - Should not compare to **China’s current property tax policy**, which may be replaced with a property tax in the near future.
- Freehold Land Tenure System (e.g., US)
 - New York: 19% of gross rent
 - Chicago: 32% of gross rent

What if Renege on HKSAR Leases?

- What if HKSAR reneges everything before June 1st, 2047?
 - This will violate Basic Law bluntly regarding the land policy.....
- Model modification:
 - λ^{pre} and extra land premium charge δ_{HK}^{pre} for non-colonial leases before τ
 - Results: Estimated reneging risk $\hat{\lambda}_{HK}^{pre} = 0$ as expected, $\hat{\delta}_{HK}^{pre} = 1.7\%$, notably smaller compared to that of colonial leases (7.5%)
- Implications:
 - Hong Kong homeowners expect the post-2047 new Hong Kong government to honor the leases renewed by the current HKSAR government.
 - The estimated zero pre-2047 reneging risk λ^{pre} and a tiny insignificant $\hat{\delta}_{HK}^{pre}$ imply the value loss is primarily due to the expectation of a higher ground rent when renewing a new contract with worse terms upon expiration.

Dynamic Estimates of Price Discounts

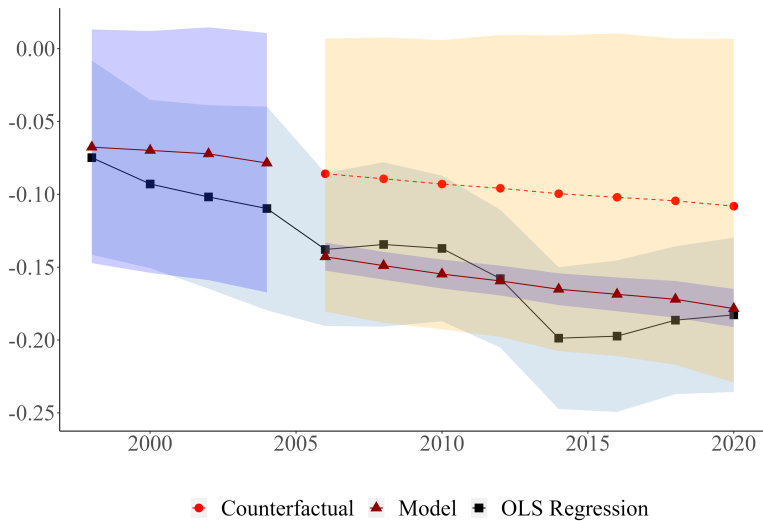
Natural time “appreciation” effect, where price discount increases as approaching 2047, vs. time-varying political uncertainty



Two Economic Mechanisms

- Reestimate the model by allowing for different sets of parameters before and after 2005, and obtain
 - Model-implied discounts for properties sold before and after 2005
 - Counterfactual model-implied price discount for properties sold after 2005 using the pre-2005 parameter estimators
- **Findings:** The estimated discounts are **not significantly different** from the counterfactual model-implied discounts, suggesting **no significant change** in political uncertainty.

Natural “Appreciation” Effect vs Time-Varying Uncertainty



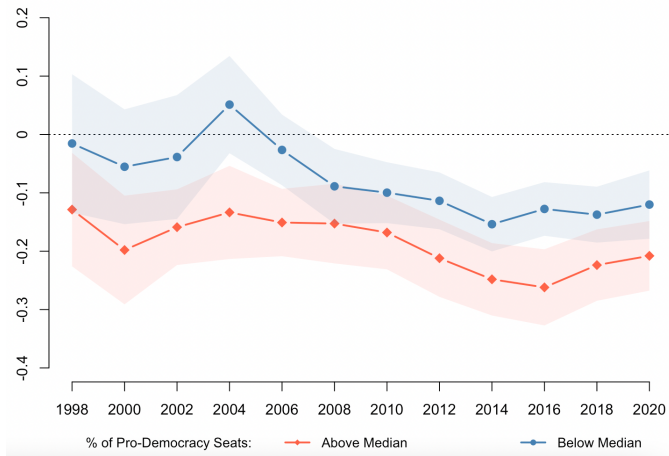
The Role of Mortgage Access

- Collateral values underlying properties in the treatment group sold after July 1st, 2017, will be exposed to significant risk (given common mortgage term of 30 years).
- Lenders may discriminate, via mortgage access, and hence affect the property equilibrium market price.
- Heated discussion on this issue in 2016 as the 2017 deadline approached, prompting the HKSAR government to grant land leases with terms extending beyond June 30th, 2047.
- Lenders, with the support of the HKSAR government, continue to approve mortgages on properties with land leases expiring after July 1st, 2047.
- The HKSAR's decisive actions around 2016 could explain the stabilization of the estimated price discount after 2015.

Local Political Sentiments

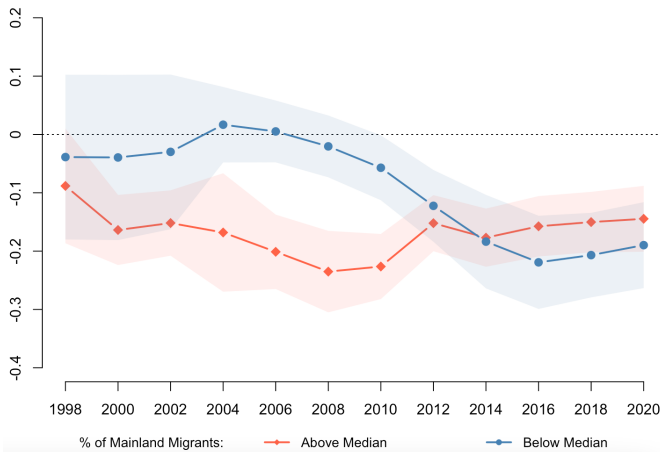
- Two measures of **local sentiments**, based on district-level socioeconomic characteristics unique to Hong Kong:
 - **Percent of pro-democracy seats**: captures local sentiments in Hong Kong's political future.
 - **Percent of residents who were born in mainland China (mainland migrants)**: measures local sentiments against cultural influences from mainland China
- Finding: Results confirm that housing price discount due to future political uncertainty increases where we see heightened local sentiment.

Districts with High Versus Low % of Pro-Democracy Seats



- In districts with high local sentiment, we observe a significant higher price discount even before 2005.

Districts with High Versus Low % of Mainland Migrants



- Similar and consistent results.

Local Political Sentiments and Price Discount

Dep Var	Log(Unit Price)					
	(1)	(2)	(3)	(4)	(5)	(6)
I(Main Treatment Group)	-0.133*** (0.021)	-0.146*** (0.020)	-0.132*** (0.021)	-0.128*** (0.021)	-0.113*** (0.023)	-0.091*** (0.025)
× % of Pro-Democracy Seats		-0.050*** (0.012)		-0.047*** (0.012)		
× % of Mainland Migrants			-0.082*** (0.024)	-0.077*** (0.024)		
× I(High % Pro-Democracy Seats)					-0.083*** (0.021)	
× I(High % Mainland Migrants)						-0.103*** (0.025)
					
Property Attributes	Yes	Yes	Yes	Yes	Yes	Yes
District × Month FE	Yes	Yes	Yes	Yes	Yes	Yes
<i>N</i>	551,790	551,790	551,790	551,790	551,790	551,790
Adjusted <i>R</i> ²	0.929	0.930	0.930	0.931	0.930	0.930

The Effect of Individual Beliefs

- Explore the perspectives of buyers and sellers from the mainland China, who are identified through their names in the transaction data.
- Our premise is that relative to Hong Kongers, mainlanders may have different beliefs on HK's political uncertainty.
- Mainland buyers, due to their experience in China, tend to be **more optimistic** about the future of "One Country, Two Systems" and thus may be willing to pay higher prices.
- However, **mainlanders who have lived in Hong Kong but have decided to sell their houses** might be those who are **more pessimistic** about Hong Kong's future.

Mainlander Transactions and Price Discount

Dep Var	Log(Unit Price)		
	(1)	(2)	(3)
I(Main Treatment Group)	-0.128*** (0.021)	-0.125*** (0.020)	-0.086*** (0.025)
× I(Mainland Buyer) × I(Local Seller)	0.008 (0.006)	0.012* (0.007)	0.011 (0.009)
× I(Mainland Buyer) × I(Mainland Seller)	-0.005 (0.012)	-0.003 (0.012)	-0.036* (0.018)
× I(Local Buyer) × I(Mainland Seller)	-0.017** (0.007)	-0.018** (0.008)	-0.048*** (0.017)
.....			
Property Attributes	Yes	Yes	Yes
District × Month FE	Yes	Yes	Yes
<i>N</i>	551,790	551,790	551,790
Adjusted R ²	0.931	0.930	0.929

- Mainland buyers **more optimistic** compared to their local counterparts (Price difference of **-0.017** is statistically significant at the 5% level).
- Mainland sellers **more pessimistic** than their local counterparts (though statistically insignificant).

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.
 - Extended to incorporate a reneging risk to colonial land contracts
 - Implies a price discount of 9.83% from today's viewpoint in a hypothetical 50-year British Hong Kong lease standing at Jan 1st, 2023.
- Analysis using district-level political uncertainty measures provides further empirical support to our mechanism.
 - No significant difference b/w rentals across control and treatment groups
 - Mainland buyers (sellers) more optimistic (pessimistic) than local

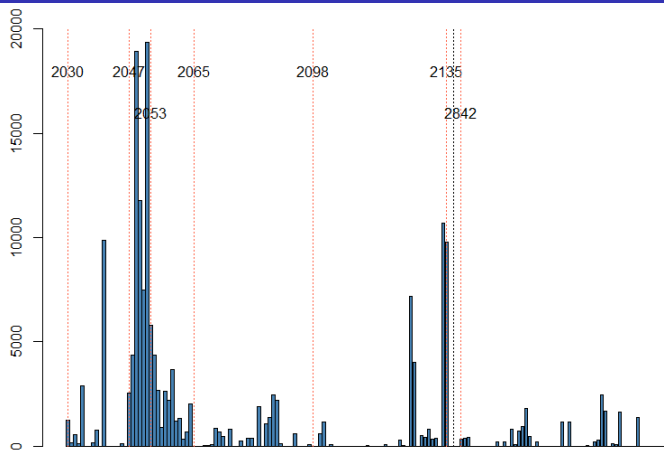
Model

- A house generates a “natural” cash-flow \hat{R}_t growing at g , $\hat{R}_t = \frac{e^{gt}}{1-\omega}$.
 - ω : percentage of maintaining costs and tax, including 3% ground rent, 5% rates, and others, so current net cash flow after costs and taxes $R_t = e^{gt}$
 - But, (expected) 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 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

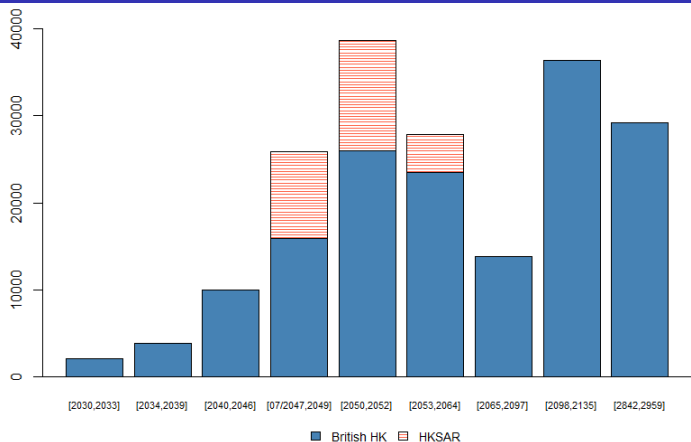
$$R_s = e^{gs} \cdot (1 - \gamma \mathbf{1}_{L+T \cdot N(s) \geq \tau})$$
 - e.g., $L = 1/1/2000 < \tau$, ground rent jumps up to $\gamma > 0$ only after 1/1/2050
- House price P_t equals discounted future cash-flows (discount rate r)

Number of Transactions: by Lease Expiration Years



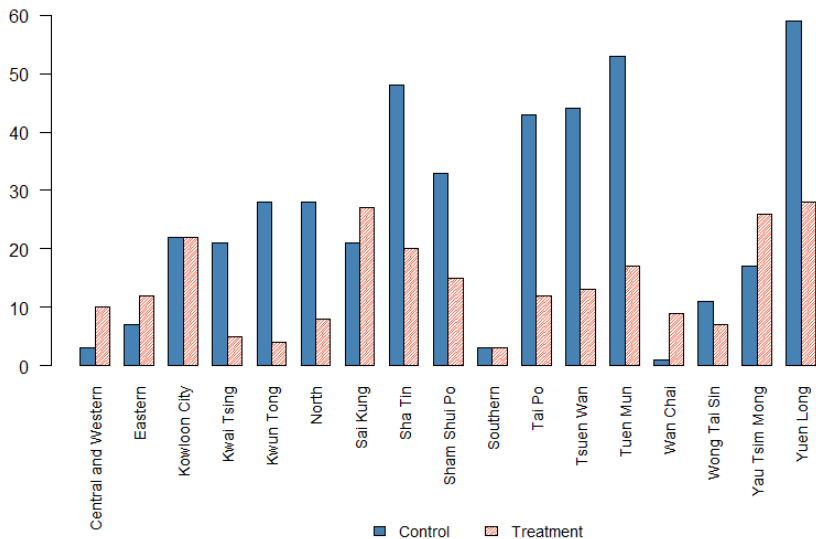
- This figure plots the number of transactions by lease expiration year from 2030 to 2135, and from 2842 to 2959.
- Lease groups constructed so that all have sufficient observations in regressions.

Transactions by Lease Groups: HKSAR vs British



- This figure plots the number of transactions by lease groups and lease types (colonial British leases or HKSAR leases).
- Treatment groups only. HKSAR leases only show up in groups ranging 2047-2064

Geographic Distribution of Leases



Matching Procedures

- **Objective:** To create matched pairs with similar observable characteristics in both groups, providing a more accurate estimate of the causal effect of the expected regime change on property prices.
- Match each unique estate in the main treatment group to all estates in the control group that are located in the same district and within 1.5 kilometer.
- Estimate the PSM score based on all housing characteristics, time, and location fixed effects as explanatory variables.
- Only include pairs of transactions that met the following restrictions:
 - A difference of less than 2 years in building completion year;
 - A difference in building age at the time of transaction within 25% of that of the treated unit;
 - A difference in net living area of less than 30% of that of the treated unit;
 - A difference in floor number within 20% of that of the treated unit;
 - A difference in the estimated PSM score of less than 0.1.
- Further select control group transactions with the nearest PSM score to each transaction in the main treatment group to achieve a matching ratio.