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
  - Focus on the first moment, “directional”
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 1\textsuperscript{st}, 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 1\textsuperscript{st}, 2047.
  - Land leases expiring on June 30\textsuperscript{th}, 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 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

- 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.

- 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.

Land Leases in Hong Kong

- Non-renewable leases in New Kowloon and New Territories that expired on June 27\textsuperscript{th}, 1997 (the 1898 Second Convention of Peking)
- See more later
Land Leases in Hong Kong

- A house generates a “natural” cash-flow $\hat{R}_t$ growing at $g$, $\hat{R}_t = \frac{e^{gt}}{1-\omega}$.
  - $\omega$ 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.
    $$f_s^{(\tau)} = \gamma 1_{\{s \geq \tau\}}, \text{ with } \tau = 7/1/2047.$$  
- 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 1\textsuperscript{st}, 2047.
- What about the land leases that have been renewed/extended by the HKSAR beyond this official expiration date?
  - Say, leases on January 1\textsuperscript{st}, 2000 expiring on January 1\textsuperscript{st}, 2050.
- On July 15\textsuperscript{th}, 1997, the HKSAR affirmed its constitutional authority to grant land leases beyond July 1\textsuperscript{st}, 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 30\textsuperscript{th}, 2047.
  - Say, the government could raise the ground rent 3\% to 25\% for leases to be renewed on January 1\textsuperscript{st}, 2050.
Model

- A house generates a “natural” cash-flow $\hat{R}_t$ growing at $g$, $\hat{R}_t = \frac{e^{gt}}{1-\omega}$.
  - $\omega$: 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, extra ground rent $f_s^{(\tau)}$ imposed by the government, e.g.
    $$f_s^{(\tau)} = \gamma 1_{s \geq \tau}, \text{ with } \tau = 7/1/2047.$$

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

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

- 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

Property Value

Guaranteed 50-year extension at current land rent (3%)

June 30, 2047

Lease Expiration Date
Model: Illustrating Examples of House Price

- Guaranteed 50-year extension at current land rent (3%)
- 50-year extension at land rent x%?
Model: Illustrating Examples of House Price

Property Value

- Guaranteed 50-year extension at current land rent (3%)
- Goal: Get expected \( x \) by the price difference
- 50-year extension at land rent \( x\% \)?

June 30, 2047

Lease Expiration Date
Model: Illustrating Examples of House Price

Property Value

Guaranteed 50-year extension at current land rent (3%)

50-year extension at land rent x%?

June 30, 2047

Lease Expiration Date
Model: Illustrating Examples of House Price

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Property Value

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June 30, 2047

Lease Expiration Date

Property Value
Model: Illustrating Examples of House Price

Property Value

Guaranteed 50-year extension at current land rent (3%)

50-year extension at land rent x%?

June 30, 2047

Lease Expiration Date
**Key assumption**: 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
- Later will let data tell us if this is a good assumption
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 ≠ building age. Average building age in HK: 31 years
### Empirical Identification

#### Before JD

**Type 1: 999-year Leases**

The earliest leases auctioned by the British Empire; Regular leases from 1843 to 1898. Very rare after 1898.

**Type 2: 75-year or 99-year leases**

Regular 75-year leases from 1843 to 1898; 99-year is rare (no such leases in our data).

**Type 3: 75+75 years or 99+99 years leases**

Regular 75+75 years leases from 1899 to 1985; 99+99 years is rare (no such leases in our data).

**Type 4: Leases expiring on 6/30/2047**

Primarily located in New Kowloon & New Territories; Original leases expiration date was 6/27/1997; Automatically extended to 6/30/2047 under JD.

#### After JD

**Type 5: Lease expiring on 6/30/2047**

The British government auctioned such leases according to the 50-year rule of JD before the handover on 7/1/1997.

**Type 6: 50-year leases**

HKSAR government auctions leases expiring on auction date + 50 years.

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2030-2033

2034-2039

2040-2046

Control Group: 6/30/2047

7/1/2047-2049

2050-2052

2053-2064

2065-2097

2098-2135

2842-2959
Empirical Specification

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

\[
\ln(P_{i,t}) = \sum_{n=1}^{n=9} \beta_n \cdot \text{Lease}_n + \eta \cdot X_{i,t} + \alpha_{d \times m(t)} + \varepsilon_{i,t},
\]

* \(X_{i,t}\) 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

<table>
<thead>
<tr>
<th>Dep Var</th>
<th>Log (Unit Price)</th>
<th>Log (Total Price)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I(2030 ≤ Lease ≤ 2033)</td>
<td>-0.057 [0.043]</td>
<td>-0.043 [0.046]</td>
</tr>
<tr>
<td>I(2034 ≤ Lease ≤ 2039)</td>
<td>-0.038 [0.039]</td>
<td>-0.042 [0.042]</td>
</tr>
<tr>
<td>I(2040 ≤ Lease ≤ 2046)</td>
<td>-0.024 [0.057]</td>
<td>-0.013 [0.060]</td>
</tr>
<tr>
<td>I(7/1/2047 ≤ Lease ≤ 2049)</td>
<td>-0.141*** [0.028]</td>
<td>-0.124*** [0.026]</td>
</tr>
<tr>
<td>I(2050 ≤ Lease ≤ 2052)</td>
<td>-0.127*** [0.028]</td>
<td>-0.127*** [0.030]</td>
</tr>
<tr>
<td>I(2053 ≤ Lease ≤ 2064)</td>
<td>-0.127*** [0.032]</td>
<td>-0.130*** [0.033]</td>
</tr>
<tr>
<td>I(2065 ≤ Lease ≤ 2097)</td>
<td>-0.105*** [0.035]</td>
<td>-0.107** [0.043]</td>
</tr>
<tr>
<td>I(2098 ≤ Lease ≤ 2135)</td>
<td>-0.022 [0.039]</td>
<td>-0.029 [0.040]</td>
</tr>
<tr>
<td>I(2842 ≤ Lease ≤ 2959)</td>
<td>-0.052 [0.035]</td>
<td>-0.054 [0.038]</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Property Attributes</th>
<th>Yes</th>
<th>No</th>
<th>Yes</th>
<th>No</th>
</tr>
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<tr>
<td>Property Attributes × Year</td>
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<td>Yes</td>
<td>No</td>
<td>Yes</td>
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<tr>
<td>District × Month FE</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>Adj $R^2$</td>
<td>0.9288</td>
<td>0.9405</td>
<td>0.9421</td>
<td>0.9509</td>
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<tr>
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<td>551,790</td>
<td>551,790</td>
<td>551,790</td>
<td>551,790</td>
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</table>
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.

<table>
<thead>
<tr>
<th>Dep Var</th>
<th>Log (Unit Price)</th>
<th>Log (Total Price)</th>
</tr>
</thead>
<tbody>
<tr>
<td>......</td>
<td>......</td>
<td>......</td>
</tr>
<tr>
<td>I(Lease = 6/30/2047 &amp; After JD)</td>
<td>0.025</td>
<td>0.025</td>
</tr>
<tr>
<td></td>
<td>[0.019]</td>
<td>[0.019]</td>
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<tr>
<td>I(Lease = 6/30/2047 &amp; Before JD and in HKL+KIL)</td>
<td>0.005</td>
<td>0.014</td>
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<td>[0.037]</td>
<td>[0.037]</td>
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<td>-0.134***</td>
<td>-0.132***</td>
</tr>
<tr>
<td></td>
<td>[0.028]</td>
<td>[0.032]</td>
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<tr>
<td>I(2050 ≤ Lease ≤ 2052)</td>
<td>-0.123***</td>
<td>-0.122***</td>
</tr>
<tr>
<td></td>
<td>[0.028]</td>
<td>[0.030]</td>
</tr>
<tr>
<td>I(2053 ≤ Lease ≤ 2064)</td>
<td>-0.124***</td>
<td>-0.122***</td>
</tr>
<tr>
<td></td>
<td>[0.032]</td>
<td>[0.035]</td>
</tr>
<tr>
<td>......</td>
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<td>......</td>
</tr>
<tr>
<td>Property Attributes</td>
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<td>Yes</td>
</tr>
<tr>
<td>District × Month</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>N</td>
<td>551,790</td>
<td>551,790</td>
</tr>
<tr>
<td>Adj $R^2$</td>
<td>0.9289</td>
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</table>
## Placebo Test: Rental Value

Rental data from Centaline Property website: from Nov. 2018 to Feb. 2020

<table>
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<tr>
<th>Dep Var</th>
<th>Log (Unit Rent)</th>
<th>Log (Total Rent)</th>
<th>Log (Unit Price)</th>
<th>Log (Total Price)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I(2030 ≤ Lease ≤ 2046)</td>
<td>-0.052*</td>
<td>-0.042</td>
<td>-0.050</td>
<td>-0.044</td>
</tr>
<tr>
<td></td>
<td>[0.029]</td>
<td>[0.030]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I(7/1/2047 ≤ Lease ≤ 2049)</td>
<td>-0.009</td>
<td>0.000</td>
<td>-0.184***</td>
<td>-0.186***</td>
</tr>
<tr>
<td></td>
<td>[0.022]</td>
<td>[0.025]</td>
<td>[0.030]</td>
<td>[0.031]</td>
</tr>
<tr>
<td>I(2050 ≤ Lease ≤ 2052)</td>
<td>-0.017</td>
<td>-0.009</td>
<td>-0.184***</td>
<td>-0.181***</td>
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<tr>
<td></td>
<td>[0.018]</td>
<td>[0.020]</td>
<td>[0.033]</td>
<td>[0.033]</td>
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<tr>
<td>I(2053 ≤ Lease ≤ 2064)</td>
<td>0.018</td>
<td>0.031</td>
<td>-0.100**</td>
<td>-0.102**</td>
</tr>
<tr>
<td></td>
<td>[0.023]</td>
<td>[0.024]</td>
<td>[0.036]</td>
<td>[0.037]</td>
</tr>
<tr>
<td>I(2065 ≤ Lease ≤ 2135)</td>
<td>-0.041*</td>
<td>-0.055*</td>
<td>-0.008</td>
<td>-0.010</td>
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<td></td>
<td>[0.022]</td>
<td>[0.026]</td>
<td>[0.038]</td>
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<td>-0.023</td>
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<td>0.029</td>
</tr>
<tr>
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<td>[0.030]</td>
<td>[0.031]</td>
<td>[0.042]</td>
<td>[0.043]</td>
</tr>
</tbody>
</table>

Property Attributes | Yes | Yes | Yes | Yes
District × Month FE | Yes | Yes | Yes | Yes

| N  | 9,171 | 9,171 | 18,029 | 18,029 |
|Adj $R^2$ | 0.8042 | 0.9170 | 0.7217 | 0.8678 |
Transactions by Lease Groups: HKSAR vs British

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

He, Hu, Wang and Yao
## Reneging Risk: Empirical Motivation

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Log (Unit Price)</th>
<th>Log (Total Price)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I(7/1/2047 ≤ Lease ≤ 2049)</td>
<td>-0.168*** [-0.029]</td>
<td>-0.176*** [0.030]</td>
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<tr>
<td>I(2050 ≤ Lease ≤ 2052)</td>
<td>-0.150*** [0.030]</td>
<td>-0.151*** [0.032]</td>
</tr>
<tr>
<td>I(2053 ≤ Lease ≤ 2064)</td>
<td>-0.135*** [0.032]</td>
<td>-0.138*** [0.033]</td>
</tr>
<tr>
<td>I(7/1/2047 ≤ Lease ≤ 2064) × I (HKSAR leases)</td>
<td>0.085*** [0.027]</td>
<td>0.088*** [0.028]</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Property Attributes</th>
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<td>Yes</td>
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<td>District × Month FE</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Adj $R^2$</td>
<td>0.9294</td>
<td>0.9409</td>
<td>0.9425</td>
<td>0.9511</td>
</tr>
<tr>
<td>$N$</td>
<td>551,790</td>
<td>551,790</td>
<td>551,790</td>
<td>551,790</td>
</tr>
</tbody>
</table>

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: $\lambda^{\text{pre}} 1_{s < \tau} + \lambda^{\text{post}} 1_{s \geq \tau}$
  - Extra land premium charge: $\delta^{\text{pre}} 1_{s < \tau} + \delta^{\text{post}} 1_{s \geq \tau}$

- House value with a British land leases ($\kappa = r - g$):
  \[
P(L; \tau, \text{Brit}) = \mathbb{E} \left[ \int_0^{L \wedge \tau} e^{-\kappa s} ds + e^{-\kappa (L \wedge \tau)} \cdot (1 - \delta^{\text{pre}} 1_{s < \tau} - \delta^{\text{post}} 1_{s \geq \tau}) \cdot P(L \wedge \tau + 50; \text{HK}) \right]
  \]
  - Reneging event $\tau$ (Poisson arrival) with intensity $\lambda^{\text{pre}} 1_{s < \tau} + \lambda^{\text{post}} 1_{s \geq \tau}$;
  - $P(L \wedge \tau + 50; \text{HK})$: value of a standard 50-year HKSAR leases standing at $L \wedge \tau \equiv \min(L, \tau)$
Estimation: Data and Model

Calibrate $\kappa = r - g$, estimate $\{\gamma, \lambda^{pre}, \lambda^{post}, \delta^{pre}, \delta^{post}\}$ that minimize the difference between model & data.
**Model Implications**

- $\hat{\gamma} = 21.81\%$: after 2047 HK homeowners expect an about 22% of penalty in order to extend their land leases 2047.

- **British HK leases**
  - Expire before 2047: no reneging risk ($\hat{\lambda}^{pre} = 0$) but need to pay a penalty (called premium) of about $\hat{\delta}_{pre} = 7.00\%$ of house value when renewal;
  - After 2047, will be reneged every 51 years after 2047 ($\hat{\lambda}^{post} = 1.96\%$), with $\hat{\delta}_{post} = 21.06\%$.

- **Standing at Jan 1\(^{st}\), 2021, identical British vs. HKSAR leases**
  - 50-year: 9.9% discount for British
  - 100-year: 10.5% discount for British
Economic Magnitude of $\gamma$: What Does It Capture?

- $\hat{\gamma} \approx 22\%$ captures the overall effect of policy uncertainty (on 2047), relatively clean identification;

- Though, estimated discount, and hence $\gamma$, might reflect both
  - increasing ground rent/premium; and
  - endogenous reaction from homeowners (say, lack of maintenance).

- Redo estimation and model calibration based on the sample of young buildings ($\leq 5$ years old) only:
  - $\hat{\gamma}$ drops to 17%, conservative estimate;
  - British leases:
    - Before $\tau$: no renege, $\hat{\delta}_{pre} = 16\%$
    - After $\tau$: renege every 32 years, $\hat{\delta}_{post} = 19\%$
Economic Magnitude of $\gamma$: International Comparison

- **Leasehold Land Tenure System (e.g., UK and former British colonies)**
  - **Hong Kong:**
    - Current policy: ground rent + rates → 8% of gross rent
    - After 2047: adding 22% (17%) of net rent → 24% (20%) of gross rent
  - **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

- **Freehold Land Tenure System (e.g., US)**
  - **New York:** 19% of gross rent
  - **Chicago:** 32% of gross rent
Model Estimates under Alternative Discount Rates

\[ \kappa = r - g = (1 - 28\%) \times \text{Gross Rental Yield} \]
What if Renege on HKSAR Leases?

- What if HKSAR renege everything before June 1\textsuperscript{st}, 2047?

- This will violate Basic Law bluntly regarding the land policy.....

- Model modification:
  - $\lambda^{pre}$ and extra land premium charge $\delta^{pre}_{HK}$ for non-colonial leases before $\tau$
  - Estimated $\hat{\lambda}^{pre}_{HK} = 0$ as expected, $\hat{\delta}^{pre}_{HK} = 2.6\%$
  - Other parameters barely change, very similar RMSE with base model: 1.28\% (base) vs 1.27\%

- The sharp relative discount b/w control vs treatment $\implies$ this is unlikely
  - Again we can only say about land renewal policy
- As confidence in Hong Kong’s future declines, the political uncertainty discount in the housing market climbs.
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.
Similar and consistent results.
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 9.9% from today’s viewpoint in a hypothetical 50-year British Hong Kong lease standing at Jan 1\textsuperscript{st}, 2021

- Citywide and district-level political uncertainty measures, 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
References


Number of Transactions: by Expiration Years

- Lease groups constructed so that all have sufficient observations in regressions.
## Control vs. Treatment

Panel B: Split Samples

<table>
<thead>
<tr>
<th>Variable</th>
<th>Control Lease Group</th>
<th>Main Treatment Lease</th>
<th>Control - Treatment</th>
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