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: 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.
  - Howe 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 30\textsuperscript{th}, 1997.

- The Sino-British Joint Declaration (JD), ratified on May 27\textsuperscript{th}, 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 broad political alignments, pro-establishment camp and pro-democracy camp, after the 2004 Legislative Council (LegCo) election.

Government Determines Lease Terms

**Government**
Colonial Hong Kong/HKSAR

- Sell land leases to the public by auctions
- Specifications of land leases:
  - **Lease term**
  - Purpose of use
  - ...

**The Public**
Real Estate Developers/Other Companies/Individuals

- Develop land to residential properties.
- Sell property units with land lease specifications unchanged

**Homeowners**

- Apply for lease extension when the original lease term ends
A house generates a “natural” cash-flow $\hat{R}_t$ growing at $g$, $\hat{R}_t = \frac{e^{gt}}{1-3\%}$.

- $3\%$ is the current baseline ground rent (like tax) imposed by government, 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.

$$f_s^{(\tau)} = \gamma 1_{\{s \geq \tau\}}$$

with $\tau = 7/1/2047$.

- Renewal date $L$, lease extension term $T = 50$ ($T$ exogenous).
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
  - e.g., January 1st, 2000, are set to expire on January 1st, 2050.
Government Renewal Decisions

- Reignant or extend non-renewable leases upon their expiry;

- 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;
  - It 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 that 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
  - “\textit{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\% at renewal on January 1\textsuperscript{st}, 2050.
A house generates a “natural” cash-flow (or gross rental income) $\hat{R}_t$ growing at $g$, 

$$\hat{R}_t = \frac{e^{gt}}{1-\omega}.$$ 

- $\omega$ is the percentage of repairing costs and taxes in gross rental income, including 3% ground rent, 5% rates, and other maintenance costs.

- Current net cash flow after costs and taxe: $R_t = e^{gt}$

- 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.

- $N(s) \equiv \lfloor s-L \rfloor / T$ is the largest integer that is below $s-L / T$.

- 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.
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 (more likely) honored by the new post-2047 HK government. "Policy continuity" in previous negotiations b/w UK, China, and HK. Exception: British HK vs. HKSAR. Model extension of reneging risk.
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Results Preview: Data and Model

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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

- Control group contains all the leases set to expire on June 30\textsuperscript{th}, 2047.
  - All existing leases that were going to expire before June 30\textsuperscript{th}, 1997, were automatically extended to June 30\textsuperscript{th}, 2047.
    - Type 4, determined by Second Convention of Peking in 1998.
  - Any land auctioned between May 27\textsuperscript{th}, 1985, and June 30\textsuperscript{th}, 1997, i.e., after JD but before the handover, are set to expire on June 30\textsuperscript{th}, 2047.

- Treatment lease groups
  - Pre-2047 leases: all the leases set to expire before 2047.
  - Post-2047 leases: further decomposed into four groups (July 1\textsuperscript{st} 2047–2049, 2050–2052, 2053–2064, and 2065–2097); leases granted by the British HK and HKSAR.
  - Distant leases: 2098–2135 and 2842–2959.
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:

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

* \(X_{i,t}\) 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.
Geographic Distribution of Leases
## 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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</thead>
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<td></td>
<td>N</td>
<td>Mean</td>
<td>SD</td>
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<tr>
<td>Log(Price)</td>
<td>363,923</td>
<td>0.89</td>
<td>0.62</td>
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<tr>
<td>Log(Unit Price)</td>
<td>363,923</td>
<td>8.51</td>
<td>0.53</td>
</tr>
<tr>
<td>Net Living Area Area</td>
<td>363,923</td>
<td>513.90</td>
<td>157.00</td>
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<tr>
<td>Floor</td>
<td>363,923</td>
<td>16.98</td>
<td>10.97</td>
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<tr>
<td>No of Bedrooms</td>
<td>363,923</td>
<td>2.06</td>
<td>0.98</td>
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<tr>
<td>No of Living Rooms</td>
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<td>1.61</td>
<td>0.77</td>
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<td>Bay Window Size</td>
<td>363,923</td>
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<td>15.25</td>
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<td>Building Age</td>
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<td>16.44</td>
<td>8.41</td>
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<td>Building Completion Year</td>
<td>363,923</td>
<td>1991</td>
<td>7.31</td>
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<td>Distance To MRT</td>
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<td>799</td>
<td>945</td>
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<td>Distance To Bus Stop</td>
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<td>313</td>
<td>292</td>
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<td>Distance To Hospital</td>
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<td>1,689</td>
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<td>Distance To School</td>
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<td>230</td>
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<tr>
<td>Distance To University</td>
<td>363,923</td>
<td>4,010</td>
<td>2,539</td>
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<td>Distance To Coastal Line</td>
<td>363,923</td>
<td>1,608</td>
<td>1,742</td>
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<td>Turnover</td>
<td>363,923</td>
<td>0.079</td>
<td>0.043</td>
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## Baseline Estimates

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<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</td>
<td>-0.054</td>
</tr>
<tr>
<td></td>
<td>[0.043]</td>
<td>[0.045]</td>
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<tr>
<td>I(2034 ≤ Lease ≤ 2039)</td>
<td>-0.038</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>[0.039]</td>
<td>[0.038]</td>
</tr>
<tr>
<td>I(2040 ≤ Lease ≤ 2046)</td>
<td>-0.024</td>
<td>-0.009</td>
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<td></td>
<td>[0.057]</td>
<td>[0.056]</td>
</tr>
<tr>
<td>I(7/1/2047 ≤ Lease ≤ 2049)</td>
<td>-0.141***</td>
<td>-0.124***</td>
</tr>
<tr>
<td></td>
<td>[0.028]</td>
<td>[0.026]</td>
</tr>
<tr>
<td>I(2050 ≤ Lease ≤ 2052)</td>
<td>-0.127***</td>
<td>-0.12***</td>
</tr>
<tr>
<td></td>
<td>[0.028]</td>
<td>[0.027]</td>
</tr>
<tr>
<td>I(2053 ≤ Lease ≤ 2064)</td>
<td>-0.127***</td>
<td>-0.090***</td>
</tr>
<tr>
<td></td>
<td>[0.032]</td>
<td>[0.028]</td>
</tr>
<tr>
<td>I(2065 ≤ Lease ≤ 2097)</td>
<td>-0.105***</td>
<td>-0.090***</td>
</tr>
<tr>
<td></td>
<td>[0.035]</td>
<td>[0.033]</td>
</tr>
<tr>
<td>I(2098 ≤ Lease ≤ 2135)</td>
<td>-0.022</td>
<td>-0.014</td>
</tr>
<tr>
<td></td>
<td>[0.039]</td>
<td>[0.035]</td>
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<tr>
<td>I(2842 ≤ Lease ≤ 2959)</td>
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<td>-0.034</td>
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<td>[0.035]</td>
<td>[0.034]</td>
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<table>
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<tr>
<th>Property Attributes</th>
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<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Attributes × Year</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>District × Month FE</td>
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<td>Yes</td>
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<table>
<thead>
<tr>
<th>Adj $R^2$</th>
<th>0.9288</th>
<th>0.9405</th>
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</thead>
<tbody>
<tr>
<td>N</td>
<td>551,790</td>
<td>551,790</td>
</tr>
</tbody>
</table>

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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>
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</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>0.024</td>
</tr>
<tr>
<td></td>
<td>[0.019]</td>
<td>[0.020]</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></td>
<td>[0.037]</td>
<td>[0.040]</td>
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<tr>
<td>I(7/1/2047 ≤ Lease ≤ 2049)</td>
<td>-0.134***</td>
<td>-0.141***</td>
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<td></td>
<td>[0.028]</td>
<td>[0.030]</td>
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<tr>
<td>I(2050 ≤ Lease ≤ 2052)</td>
<td>-0.123***</td>
<td>-0.123***</td>
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<tr>
<td></td>
<td>[0.028]</td>
<td>[0.030]</td>
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<tr>
<td>I(2053 ≤ Lease ≤ 2064)</td>
<td>-0.124***</td>
<td>-0.126***</td>
</tr>
<tr>
<td></td>
<td>[0.032]</td>
<td>[0.034]</td>
</tr>
<tr>
<td>Property Attributes</td>
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<td>Yes</td>
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<tr>
<td>District × Month</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>N</td>
<td>551,790</td>
<td>551,790</td>
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<tr>
<td>Adj $R^2$</td>
<td>0.9289</td>
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Transactions by Lease Groups: HKSAR vs British

- Treatment groups only. HKSAR leases only show up in groups ranging 2047-2064
### Reneging Risk: Empirical Motivation

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Log (Unit Price)</th>
<th>Log (Total Price)</th>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I(7/1/2047 ≤ Lease ≤ 2049)</td>
<td>-0.168*** -0.148***</td>
<td>-0.176*** -0.152***</td>
</tr>
<tr>
<td></td>
<td>[0.029]</td>
<td>[0.026]</td>
</tr>
<tr>
<td>I(2050 ≤ Lease ≤ 2052)</td>
<td>-0.150*** -0.141***</td>
<td>-0.151*** -0.141***</td>
</tr>
<tr>
<td></td>
<td>[0.030]</td>
<td>[0.028]</td>
</tr>
<tr>
<td>I(2053 ≤ Lease ≤ 2064)</td>
<td>-0.135*** -0.097***</td>
<td>-0.138*** -0.097***</td>
</tr>
<tr>
<td></td>
<td>[0.032]</td>
<td>[0.027]</td>
</tr>
<tr>
<td>I(7/1/2047 ≤ Lease ≤ 2064) × I (HKSAR leases)</td>
<td>0.085*** 0.074***</td>
<td>0.088*** 0.075***</td>
</tr>
<tr>
<td></td>
<td>[0.027]</td>
<td>[0.025]</td>
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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>
</thead>
<tbody>
<tr>
<td>Property Attributes × Year</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>District × Month FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>$N$</td>
<td>551,790</td>
<td>551,790</td>
<td>551,790</td>
<td>551,790</td>
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</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 (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 ($\kappa = r - g$):

\[
P(L; \tau, \text{Brit}) = E \left[ \int_0^{L \land T} e^{-\kappa s} ds + e^{-\kappa (L \land T)} \cdot (1 - \delta) \cdot P(L \land T + 50; \text{HK}) \right]
\]
  - Reneging event $T$ (Poisson arrival) with intensity $\lambda 1_{\{s \geq \tau\}}$;
  - $P(L \land T + 50; \text{HK})$ is a standard 50-year Hong Kong land lease after expiation or reneging (whichever comes the first, $L \land T \equiv \min(L, T)$)
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\%.
Economic Magnitude of $\gamma$: What Does It Capture?

- $\hat{\gamma} \approx 25\%$ 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 $20\%$, conservative estimate;
  - British leases renege every 57 years with additional penalty of $12\%$. 
Economic Magnitude of $\gamma$: International Comparison

- **Leasehold Land Tenure System (e.g., UK and former British colonies)**
  - **Hong Kong:**
    - Current policy: ground rent + rates $\rightarrow$ 8% of gross rent
    - After 2047: adding 25% (20%) of net rent $\rightarrow$ 26% (22.4%) 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
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.
Local Sentiment: Cross-sectional versus Time Variation

- Similar and consistent results.
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.

