

# Housing Market Regulations and Strategic Divorce Propensity in China

*(Journal of Population Economics, 2021)*

James Alm  
Tulane University

Weizheng Lai (赖玮铮)  
University of Maryland

Xun Li (李汛)  
Wuhan University

4th Renmin-GLO Conference

December 12, 2021

# Skyrocketing Housing Prices in China

- China's housing prices have been soaring for decades, leading to universal grievances among families
  - In 2009, TV series "*Dwelling Narrowness*" (蜗居) depicted hardships under the out-of-reach housing prices and received a historical rating

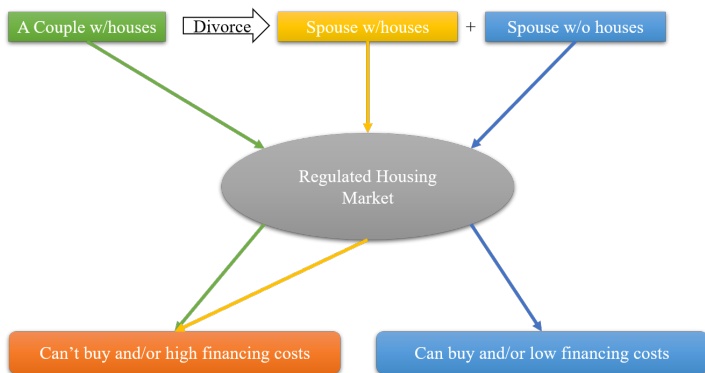


Figure: Working hard to afford snail-shell-like housing

# Housing Market Regulations

- Rising housing prices could be harmful: (i) financial risks; (ii) misallocation of talent (L. Li and Wu, 2014); (iii) social instability...
- Aware of these problems, since 2009, the Chinese govt enacted **demand-side** regulations to “suppress unreasonable housing demand”
  - Too many speculators in the mkt: they snapped up housing but didn't live in
- *Quota restriction* (限购) and *credit restriction* (限贷)
  - A family that already owns one housing can't buy a second one, or it's way costly to do so (extremely high downpayments)
- Enforcement is based on **family** (1 married couple = 1 family)
- Obvious loophole: a restricted couple can get divorced, creating *two families* in the legal sense, one of which is eligible to buy a second housing or to do so at lower costs

# Divorce Incentives



# Research Question and Literature

- **Did housing market regulations stimulate such “strategic divorce”?**
  - It's strategic b/c spouses don't break up due to struggles, and many of them should maintain *de facto* marriage
- Little empirical evidence at the time
- Important to policy evaluation: strategic divorce might bring considerable moral hazards (“true divorce”); it could also weaken policy effectiveness
  - Existing literature looks at regulation effectiveness: Du and Zhang (2015), V. J. Li et al. (2017), and Sun et al. (2016)
- Behavioral/marital responses to economic environment
  - Business cycle: Hellerstein et al. (2013); taxation: Alm and Whittington (1999), Alm and Whittington (2003), and Whittington and Alm (1997); ...
- Methodologically, we use online search data to proxy for strategic divorce behavior, overcoming measurement difficulties even microdata can't solve
  - Growing literature using search data: Stephens-Davidowitz (2014), Kearney and Levine (2015), and Qin and Zhu (2018)

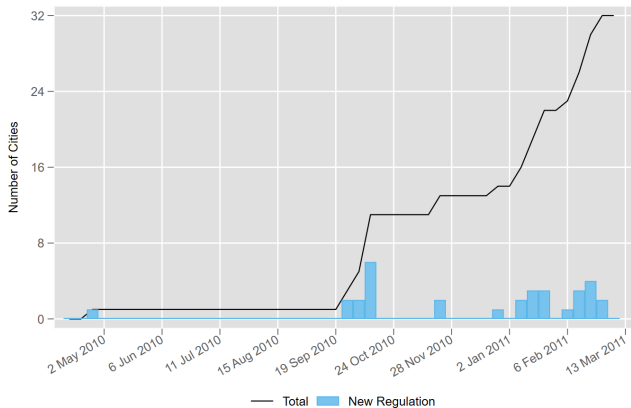
# Preview of Results

- ① Using a staggered diff-in-dff design, the estimate suggests that housing market regulations increased **divorce-related** searches
- ② **Marriage-related** and **true divorce-related** searches didn't change
  - Suggest that divorce-related searches were driven by strategic intentions, rather than by precaution prior marriage or true divorce intentions
- ③ Strategic divorce was less prevalent in cities with
  - a higher male-female ratio
  - stronger Confucian ideologies

# Data: Regulation Policies

- Sample: 2009–2016, 32 major cities
  - 4 directly controlled municipalities + 5 self planned municipalities + 23 provincial capitals
- Exact timing of housing market regulations/deregulations: substantial timing variations
- Three periods:
  - ① Regulation (2010–2011): Beijing was the first on April 20, 2010; others followed up later
  - ② Deregulation (2014): many cancelled regulations
  - ③ Re-regulations (2016): regulations were imposed again in some cities

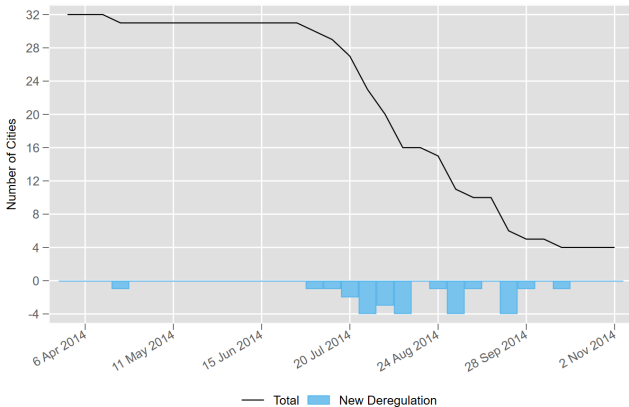
# Regulations, 2010–2011





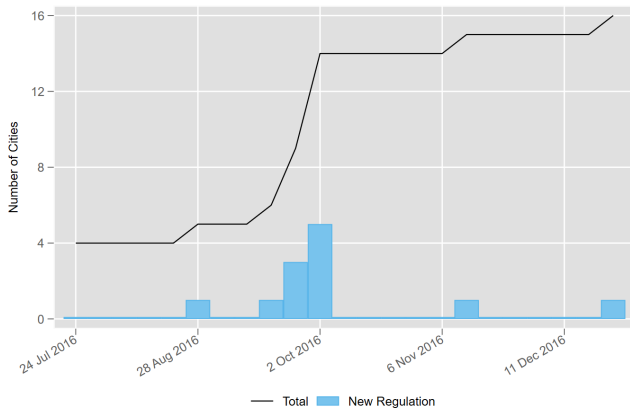
# Deregulations, 2014

- Only Beijing, Shanghai, Guangzhou, and Shenzhen didn't deregulate



# Re-regulation, 2016

- 12 cities imposed regulations again

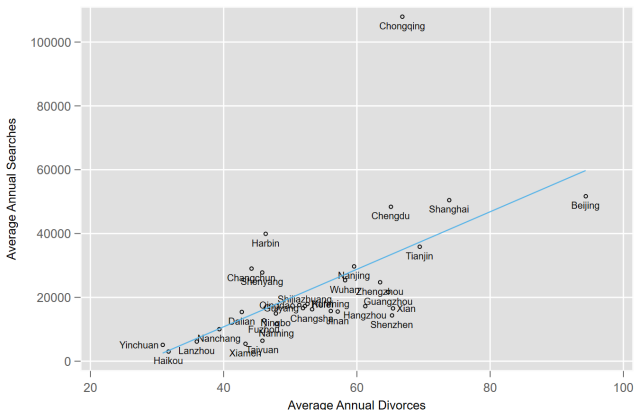


# Data: Online Searches from Baidu Index

- How to measure strategic divorce?
- Usual divorce statistics, even admin microdata, can't help
  - They include strategic divorce + true divorce, which can't be separated as divorce reasons are not recorded
- Online search data may overcome this challenge: keywords indicate intentions
- Weekly searches for 2 **divorce-related** keywords on Baidu
  - ① *Divorce Agreement* (离婚协议): main dependent
  - ② *Divorce Process* (离婚手续)
- By searching these terms, people look for information on how to get divorced, capturing restricted couples' strategic divorce propensity
  - They want to get divorced ASAP for housing purchases
  - Except for professionals, most people lack the knowledge

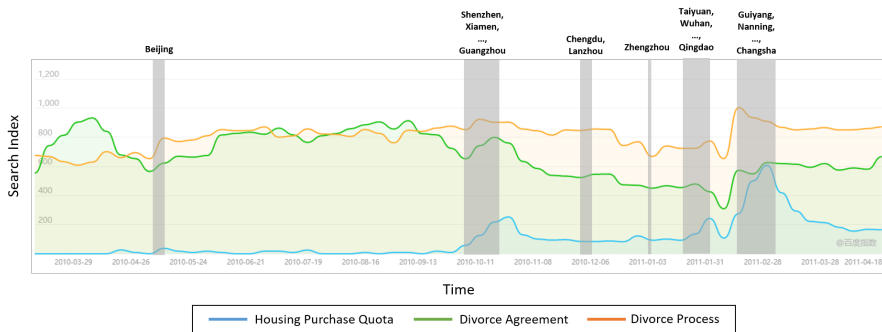
# Are Search Data Informative?

- To the extent that divorce-related searches capture divorce intentions, they should be reflected in divorce statistics
- $Corr(\text{Divorce Agreement}, \text{Divorces}) = 0.6$  (0.7 if dropping outlier Chongqing)



# Observational Evidence

- Once a regulation is implemented, searches for the policy and divorce information go up together



# Staggered Diff in Diff

- In a city-week panel:

$$\ln(Y_{ct}) = \beta_0 + \beta_1 D_{ct} + x'_{ct} \gamma + \lambda_c + \mu_t + \delta_{ct} + \epsilon_{ct} \quad (1)$$

- $c = \text{city}$ ;  $t = \text{time (in weeks)}$
- $Y_{ct} = \text{search volumes (main keyword: *Divorce Agreement*)}$
- $D_{ct} = 1$  if city  $c$  was under regulation at time  $t$ 
  - Recall cities entered regulation at different times
- $\lambda_c, \mu_t, \delta_{ct} = \text{city FE, time FE, city} \times \text{month FE}$
- $x_{ct}$ : time-varying city covariates [List](#)
- $\epsilon_{ct}$ : clustered at the city level

## Identifying Assumption (for $\beta_1$ )

$$\ln(Y_{ct}) = \beta_0 + \beta_1 D_{ct} + x'_{ct}\gamma + \lambda_c + \mu_t + \delta_{ct} + \epsilon_{ct}$$

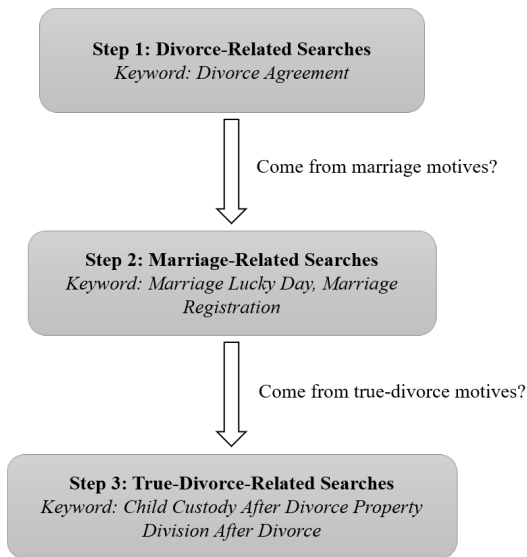
- All cities were treated at certain times
- **Common trends:** the evolution of searches does not differ systematically between cities in the absence of regulations, conditional on FEs and controls
- It may hold due to quasi-random timing: there would be a regulation sooner or later, but starting from which week is idiosyncratic
  - Recall the large timing variations
- Event-study results show lack of pretrends

# Interpretation: Strategic Divorce or Not?

- ① Divorce-related searches may be contaminated by **true divorce propensity**, on top of strategic divorce propensity
  - We look at changes in searches for *Child Custody After Divorce* (离婚抚养权) and *Property Division After Divorce* (离婚财产分割)
  - Couples shouldn't care if they just get divorced strategically
- ② Divorce-related searches also reflect **marriage propensity**: some people just search to gain some knowledge for future protection
  - We look at changes in searches for *Marriage Lucky Day* (结婚吉日) and *Marriage Registration* (结婚登记)
- ③ If regulations somehow increased true divorce and marriage propensities, our estimate is contaminated
- ④ A reasoning framework helps rule out competing explanations



# Reasoning Framework



# Increased Divorce-Related Searches

- Regulations increased searches for “*Divorce Agreement*” by 10%

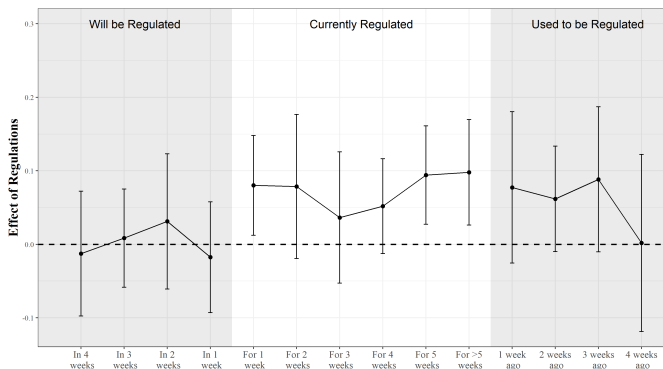
Table: Impact of Housing Market Regulations on Divorce-Related Searches

	(1)	(2)	(3)	(4)
	$\ln Y_{ct}$	$\ln Y_{ct}$	$\ln Y_{ct}$	$Y_{ct}$
Regulation	0.124*** (0.031)	0.114*** (0.028)	0.105*** (0.028)	0.084*** (0.023)
Wild Bootstrap <i>t/z</i> -statistic	4.063	4.020	3.649	3.124
Wild Bootstrap <i>p</i> -value	0.000	0.000	0.001	0.002
City FE	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
City-Month FE	N	N	Y	Y
Controls	N	Y	Y	Y
Method	OLS	OLS	OLS	PPML
Adj. R squared	0.523	0.528	0.537	0.332
Observations	13344	13344	13344	13344

Note: Standard errors clustered at city level are reported in the parentheses. \*  $p < 0.1$  \*\*  $p < 0.05$  \*\*\*  $p < 0.01$

# Event Study Results

- Regulations have been turned on and off in our sample period
- No pretrends prior a regulation
- Searches surged (dropped) as regulations came (left)



# Not Driven by Other Search Intentions

- For marriage and true divorce related searches, only data after 2011
- Increased divorce-related searches should solely come from strategic divorce

**Table:** Impacts of Housing Market Regulations on Other Searches

	Replication	Marriage-Related		True-Divorce-Related	
	(1) ln $Y_{ct}$	(2) Lucky Day	(3) Registration	(4) Child Custody	(5) Property Division
Regulation	0.049** (0.024)	-0.321 (0.325)	0.011 (0.236)	-0.003 (0.098)	-0.045 (0.320)
Wild Bootstrap $t$ -statistic	2.011	-0.966	0.044	-0.031	-0.139
Wild Bootstrap $p$ -value	0.054	0.343	0.965	0.976	0.890
City FE	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y
City-Month FE	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y
Adj. R squared	0.498	0.483	0.488	0.182	0.409
Observations	8764	8764	8764	8764	8764

Note: Standard errors clustered at city level are reported in the parentheses. \*  $p < 0.1$  \*\*  $p < 0.05$  \*\*\*  $p < 0.01$

# Heterogeneous Effects

- Higher sex ratio: husbands are more concerned about moral hazards
- Stronger Confucianism: emphasis on family stability

Table: Heterogeneous Impacts of Housing Market Regulations

	Dependent Variable: $\ln Y_{ct}$			
	(1) Regulated 2010 [Mean = 0.438]	(2) Male-Female Ratio-1 [Mean = 0.029]	(3) Pop. Density [Mean = 0.072]	(4) Confucian Temples [Mean = 547]
Regulation	0.100*** (0.027)	0.123*** (0.031)	0.109*** (0.036)	0.100*** (0.029)
Regulation $\times$ Z	0.009 (0.029)	-0.824** (0.355)	-0.046 (0.361)	-3.22e-5** (1.22e-5)
WB <i>t</i> -statistic for Regulation	3.658	3.842	2.882	3.277
WB <i>p</i> -value for Regulation	0.001	0.001	0.007	0.003
WB <i>t</i> -statistic for interaction	0.320	-2.245	-0.124	-2.551
WB <i>p</i> -value for interaction	0.763	0.016	0.911	0.015
City FE	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
City-Month FE	Y	Y	Y	Y
Controls	Y	Y	Y	Y
Adj. R squared	0.537	0.538	0.537	0.573
Observations	13344	13344	13344	11259

Note: Standard errors clustered at city level are reported in the parentheses. \*  $p < 0.1$  \*\*  $p < 0.05$  \*\*\*  $p < 0.01$

# Concluding Remarks

- Couples strategically divorced to get around housing market regulations
- Traditional values mitigated arbitrage behavior
- Online search data can be a useful tool for detecting behavioral response, evaluating policies, ...
- It's crucial for the govt to consider unintended effects on the marriage market when designing regulations
  - Some govts are already aware of this, e.g., starting from January 21, 2021, Shanghai's regulations considered a divorced couple as married in the first three years of a divorce
  - An open question whether such "one-size-fits-all" policy would backfire: reasonable housing demand is still there; it might harm truly divorced couples

Thanks!

Email: [laiwz@umd.edu](mailto:laiwz@umd.edu)

Web: [laiwz.github.io](http://laiwz.github.io)

# References I

- Alm, James and Leslie A. Whittington (1999). "For Love or Money? The Impact of Income Taxes on Marriage". In: *Economica* 66.263, pp. 297–316. URL: <http://www.jstor.org/stable/2555086>.
- (2003). "Shacking up or Shelling Out: Income Taxes, Marriage, and Cohabitation". In: *Review of Economics of the Household* 1.3, pp. 169–86.
- Chen, Ting, James Kai-sing Kung, and Chicheng Ma (2020). "Long live Keju! The Persistent Effects of China's Civil Examination System". In: *The Economic Journal* 130.631, pp. 2030–2064.
- Du, Zaichao and Lin Zhang (2015). "Home-purchase Restriction, Property Tax and Housing Price in China: A Counterfactual Analysis". In: *Journal of Econometrics* 188.2, pp. 558–568.
- Hellerstein, Judith K, Melinda Sandler Morrill, and Ben Zou (2013). "Business Cycles and Divorce: Evidence from Microdata". In: *Economics Letters* 118.1, pp. 68–70.
- Kearney, Melissa S and Phillip B Levine (2015). "Media influences on Social Outcomes: The Impact of MTV's 16 and Pregnant on Teen Childbearing". In: *American Economic Review* 105.12, pp. 3597–3632.
- Li, Lixing and Xiaoyu Wu (2014). "Housing Price and Entrepreneurship in China". In: *Journal of Comparative Economics* 42.2, pp. 436–449.



## References II

- Li, Victor Jing, Andy Wui Wing Cheng, and Tsun Se Cheong (2017). "Home Purchase Restriction and Housing Price: A Distribution Dynamics Analysis". In: *Regional Science and Urban Economics* 67, pp. 1–10.
- Qin, Yu and Hongjia Zhu (2018). "Run away? Air pollution and emigration interests in China". In: *Journal of Population Economics* 31.1, pp. 235–266. DOI: 10.1007/s00148-017-0653-0. URL: <https://doi.org/10.1007/s00148-017-0653-0>.
- Stephens-Davidowitz, Seth (2014). "The Cost of Racial Animus on a Black Candidate: Evidence Using Google Search Data". In: *Journal of Public Economics* 118, pp. 26–40.
- Sun, Weizeng et al. (2016). "The Housing Market Effects of Local Home Purchase Restrictions: Evidence from Beijing". In: *The Journal of Real Estate Finance and Economics* 55.3, pp. 288–312. DOI: 10.1007/s11146-016-9586-8.
- Whittington, Leslie A. and James Alm (1997). "'Til Death or Taxes Do Us Part: The Effect of Income Taxation on Divorce". In: *The Journal of Human Resources* 32.no. 2, pp. 388–412.

# Summary Statistics

Table: Summary Statistics

	Frequency	Obs.	Mean	Std. Dev.	Min.	Max.
<i>Panel A: Policy and Baidu Indices</i>						
Regulation	Weekly	13344	0.507	0.500	0	1
Baidu Index on <i>Divorce Agreement</i>	Weekly	13344	54.043	23.116	0	950.303
Baidu Index on <i>Divorce Process</i>	Weekly	13344	49.833	26.187	0	188.788
Baidu Index on <i>Child Custody After Divorce</i>	Weekly	10016	9.424	29.048	0	289
Baidu Index on <i>Property Division After Divorce</i>	Weekly	10016	82.607	113.877	0	523
Baidu Index on <i>Marriage Lucky Day</i>	Weekly	10016	189.361	220.055	0	1440
Baidu Index on <i>Marriage Registration</i>	Weekly	10016	106.540	145.475	0	822
<i>Panel B: City Covariates</i>						
Population	Yearly	13344	768.503	554.287	155.550	3392
Population density	Yearly	13344	0.072	0.044	0.016	0.276
Sex ratio (male/female)	Yearly	13344	1.029	0.036	0.836	1.135
GDP per capita (10,000 RMB)	Yearly	13344	7.392	3.886	2.195	46.775
Average savings (10,000 RMB)	Yearly	13344	13.654	12.340	3.182	116.118
Change of HPI (%)	Monthly	13344	0.413	1.031	-5.200	19.100
Unemployment rate (%)	Yearly	13344	2.953	0.785	0.900	5.700
Confucian academies during Ming-Qing	Invariant	11259	546.556	694.481	10	2175

Data sources: Regulation policies are collected from government documents and media reports. Baidu Indices are scraped from the website <http://index.baidu.com>. City covariates are from China City Yearbooks, National Bureau of Statistics, and Chen et al., 2020.

# Covariates

- Population density, average deposits, GDP per capita, growth rate of the housing price index, sex ratio (males relative to females), and unemployment rate

# Robustness Checks

- Col 1: searches for *Divorce Process* as dependent
- Col 2: drop HPI from controls (bad control problem)
- Col 3 & 4: drop special cities
- Col 5: case study for Beijing; trends might not be fully controlled by FEs given the high-frequency data

Table: Robustness Checks

	(1)	(2)	(3)	(4)	(5)
	Alt. Keyword	Drop HPI	No DCM	No BSGS	Beijing Treated
Regulation	0.438*** (0.098)	0.122*** (0.031)	0.078** (0.028)	0.046* (0.025)	0.039** (0.015)
Wild Bootstrap t-statistic	4.321	3.744	2.709	1.838	2.382
Wild Bootstrap p-value	0.000	0.001	0.012	0.077	0.024
City FE	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y
City-Month FE	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y
Method	0.762	0.532	0.490	0.489	0.572
Adj. R squared	13344	13344	11676	11676	2880

Note: Standard errors clustered at city level are reported in the parentheses. \*  $p < 0.1$  \*\*  $p < 0.05$  \*\*\*  $p < 0.01$