Under Control? Price Ceiling, Waiting, and Misallocation: Evidence from the Housing Market in Shanghai

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Abstract

This paper develops a model to study the general equilibrium effect of price control policies in the housing market in Shanghai. The government has imposed a price ceiling on new houses in Shanghai since 2017 to control housing price growth.

The proposed framework extends the existing literature by allowing consumers to be forward-looking. Consumers can choose to wait, pay the entry/waiting cost, and re-enter the market if houses are not allocated to them currently due to excess demand.

The structural estimation results suggest that the welfare loss associated with the price ceiling is around 10.5 billion US dollars from 2018 to 2020. Entry/waiting costs account for 37% of the total welfare loss. We also provide several counterfactual analyses to explore the optimal policies

Introduction

To control the rapid growth of the housing price in China, the government in almost all big cities in China imposed price ceiling on new houses. The annual sales of the new houses in China is 2 trillion US dollars in 2018, or 16 % of China's GDP.

Price ceiling generates excess demand. The government uses a lottery to clear the demand. The lottery winning rate for some hot properties are as low as 7%. Lottery and excess demand mean waiting: once the buyers cannot obtain the good in the current period due to the price ceiling, they can wait and participate in the market next time.

Entry and waiting cost is an important dimension of welfare loss that is ignored by the existing literature that study the price control policies.

This paper focuses on Shanghai, the largest city in China, and the first to impose price ceilings on new houses in China. Shanghai imposed the price ceiling on new houses in 2017. The existing houses remain unregulated due to difficulties in implementation. I study the impact of the price ceiling policy in Shanghai from 2018 to 2020

I focus on the following **research questions:** (1) What is the extent of the welfare loss associated with price ceiling? (2) How does the assumption of forward-looking consumers change the estimated welfare implications of the price ceiling policy?; (3) Are there any alternative policies?

Findings: (1) Entry\waiting costs play an important role in households' decisions. (2) Aggregate welfare loss is around 7.4 billion USD from 2018 to 2020 in Shanghai. (3) The price ceiling in Shanghai has a small positive impact on consumer surplus, while it reduces producer surplus significantly. (4) Increase the supply has welfare benefits.

Contributions: (1) I extend the literature on price ceilings by using a dynamic framework with the entry/waiting. I find that the entry/waiting costs are significant in price ceiling. (2) I use a structural model to study the general equilibrium effects of price control policies. (3) Housing market regulations in China.

Model

Demand: Household i's utility function of purchasing house j successfully:

$$u_{ij} = x_j\beta_i - \alpha_i\, p_j + \xi_j + \epsilon_{ij}$$

Household i chooses among three options: (1) Purchasing a new house (j, new) with probability $1 - Pr_{ij}$of losing the lottery and paying the entry/waiting costs; (2) Purchasing an existing house (j, old). (3) The outside option.

Household i's value function:

$$V_{it} = Max\left\{\max_j\{u_{ij,new,t} * Pr_{j,new,t} + (1 - Pr_{j,new,t})(V_{i,t+1} - c),\ \max_j\{u_{ij,new,t}\}, 0\right\}$$

Stability assumptions: $V_{it} = V_{it+1}, V_{i,old,t} = V_{i,old,t+1}$

Define $V_{ij,new} = u_{ij,new} * Pr_{j,new} + (1 - Pr_{j,new})(V_{ij,new} - c)$

$$V_{ij,new} = u_{ij,new} - \frac{1 - Pr_{j,new}}{Pr_{j,new}} c$$

Allow for more flexibility:

$$V_{ij,new} = u_{ij,new} - \frac{1 - Pr_{j,new}}{Pr_{j,new}} c_1 - \left(\frac{1 - Pr_{j,new}}{Pr_{j,new}}\right)^2 c_2$$

Adding random coefficients on α and c, consumers' utility of choosing project j is:

$$u_{ij} = x_j\beta_i - \alpha_i\, p_j - -\frac{1 - Pr_{j,new}}{Pr_{j,new}} c_1 - \left(\frac{1 - Pr_{j,new}}{Pr_{j,new}}\right)^2 c_2 + \xi_j + \epsilon_{ij}$$

The rest is using BLP to calculate the aggregate market share.

Supply: binary choice problem. For a given price p, the buyers decide whether to sell the house or not.

Equilibrium

New house market: supply+equilibrium queuing line=demand

$$D_j(p_j, Pr_{j,new}, p_{-j}, Pr_{-j,new}) = K_j + N_j(p_j, Pr_{j,new}, p_{-j}, Pr_{-j,new})$$

Where K_j is the supply of the new houses, and is assumed to be fixed in the medium-run. $N_j(p_j, Pr_{j,new}, p_{-j}, Pr_{-j,new})$ is the equilibrium queuing line.

Existing house market: supply=demand

$$D_j(p_j, p_{-j}, Pr_{-j,new}) = s_j(p_j)$$

Steady state balanced conditions: in the steady state, the arrival of new consumers equals the total supply of the new house.

Identification

Instruments for the price ceiling (new house price): land price. Unobserved location effects are absorbed by town/subdistrict fixed effects.

Instruments for the existing house price: The number of listings of the existing houses in the nearby town/subdistricts (within 10 km) with similar characteristics.

Instruments for the waiting/entry costs: Recall that $Pr_{j,new} = \frac{K_j}{D_j}$. K_j is pre-determined when the developers purchase the land and is before the price ceiling policy. So use K_j as its instrument.

Results

Demand estimation results

		(1)	(2)	(3)	(4)	(5)	(6)
		logit		β=0.98	random coeficient model		myopic
linear coef	non-linear coef						
price per square meters		-0.93***	-0.910***	-0.910***	-1.45***	-1.35***	-0.22*
		(0.302)	(0.302)	0.302	(0.070)	(0.119)	(0.13)
	× household size				0.049	0.058	
					(0.225)	(0.255)	
	× high income				0.028	0.025	
					(0.069)	(0.105)	
	× college				-0.061	-0.052	
					(0.060)	(0.122)	
	× age				0.287***	0.261***	
					(0.067)	(0.070)	
$\frac{1-Pr_j}{Pr_j}$		-0.30***	-0.606***	-0.599***	-0.629***	-0.986***	
		(0.113)	(0.143)	(0.146)	(0.066)	(0.105)	
	× household size				0.134***	0.119***	
					(0.020)	(0.033)	
	× high income				0.097***	0.090***	
					(0.011)	(0.025)	
	× college				0.073***	0.074***	
					(0.011)	(0.026)	
	× age				0.179***	0.174**	
					(0.060)	(0.080)	
$(\frac{1-Pr_j}{Pr_j})^2$			0.0293**	0.031**		0.035**	
			(0.0145)	0.015		(0.015)	
Town by house type FE	Y	Y	Y	Y	Y	Y	Y
Quarter FE	Y	Y	Y	Y	Y	Y	Y
District by year FE	Y	Y	Y	Y	Y	Y	Y

Supply estimation results

	Logit (1)
price per sq meters	0.356
	(0.267)
Product fixed effects	Y
Quarter fixed effects	Y
Developer size	Y
District by year fixed effects	Y

Model fit

Figure: Current model

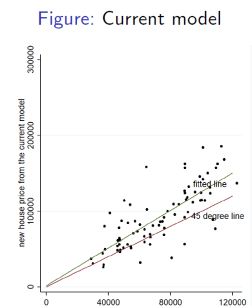
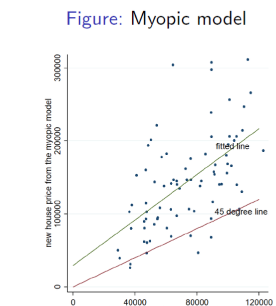


Figure: Myopic model



Counterfactual

Welfare calculation without price ceiling

in billion US dollars	CS	PS	SS	total surplus	welfare loss
with price ceiling	50.99	94.81-C	154.69	300.49-C	
without price ceiling	50.67	102.75-C	154.44	307.89-C	7.4

Calculate the welfare implications without price ceiling

CS: consumer surplus; PS: producer (developer) surplus; SS: seller surplus
(1) New house prices would be 15 % higher is there is no price ceiling.
(2) Price ceiling also decreases the existing house price by 0.1 %.
(3) The welfare loss due to the entry cost is 3.8 billion US dollars.

Alternative policies: (1) Imposing a 10% price ceiling on the existing houses; (2) Increase the new house supply by converting the agricultural land in suburban area.

Conclusions

In this paper, I extend the framework of price ceiling by incorporating entry/waiting costs in the model. In my model, Households are forward-looking when they face a price ceiling. Entry/waiting cost becomes an important dimension of welfare loss of the price control policies.

Welfare loss due to the price ceiling in Shanghai from 2018 to 2020 is around 7.4 billion US dollars. The entry/waiting cost account for around half of the welfare loss.

Contact

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