How Does Land Use Policy Affect Local Labor Market and Housing Market?

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  - the set of rules and regulations that directly influence the use of commercial land, industrial land, or residential land use.

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- ▶ The paper seeks to
  - ▶ investigate the effects of land use policy on the local labor market
  - ▶ address one of the problems associated with urbanization in China: soaring housing prices

Literature

- ► Land use policy
  - ► agricultural land conversion

    Fu et al., 2021; Adamopoulos and Restuccia, 2014

  - ► industrial and agricultural

    Adamopoulos and Restuccia, 2020; Chen et al., 2022; Ghatak and Roy, 2007; Tian et al., 2022; Cai et al., 2013

  - ► urban land

    Fang et al., 2022; Fei, 2020; Zhao and Zhang, 2022; Zhang, 2022; Cai et al., 2017; Brueckner et al., 2017

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- ► Urbanization
  - ► local labor market

    Sato and Zenou, 2015; Wheaton and Lewis, 2002; Tabuchi, 1986

  - ► housing market

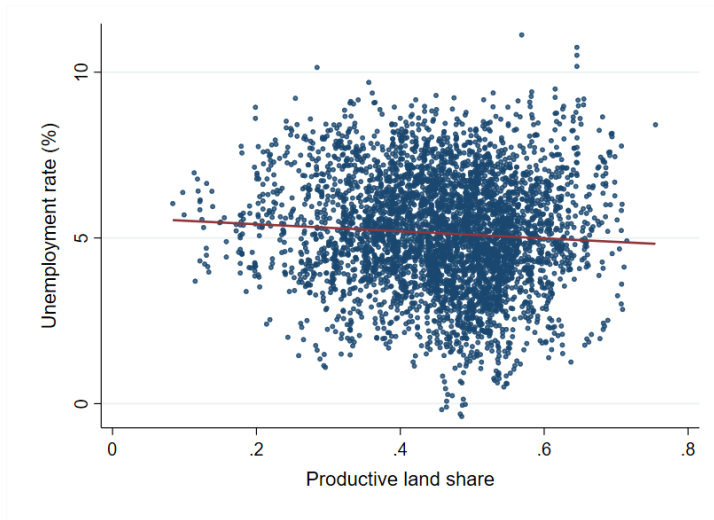   Dasgupta et al., 2014; Liu et al., 2018; Lan et al., 2021; Du and Zheng, 2020
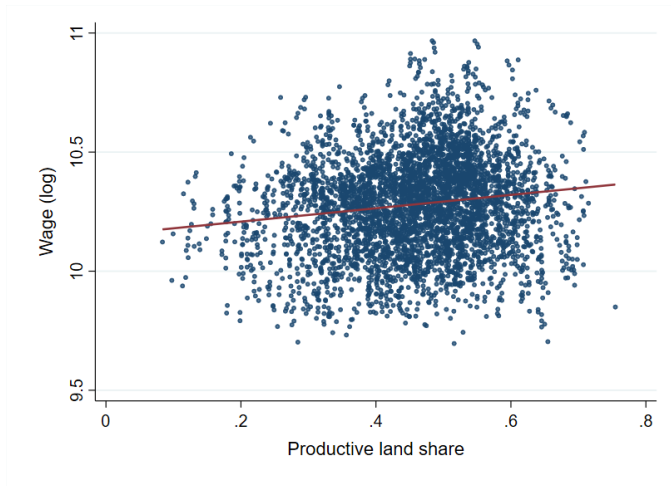
Agenda

Motivating Facts

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 - more employment opportunities for local workers and immigrants

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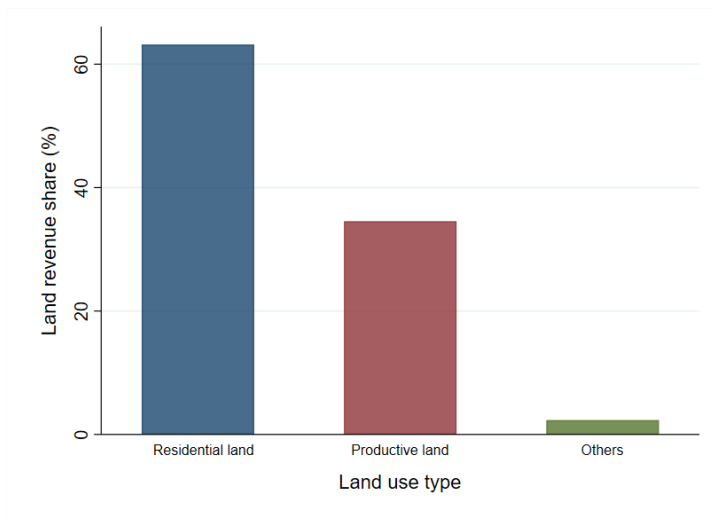
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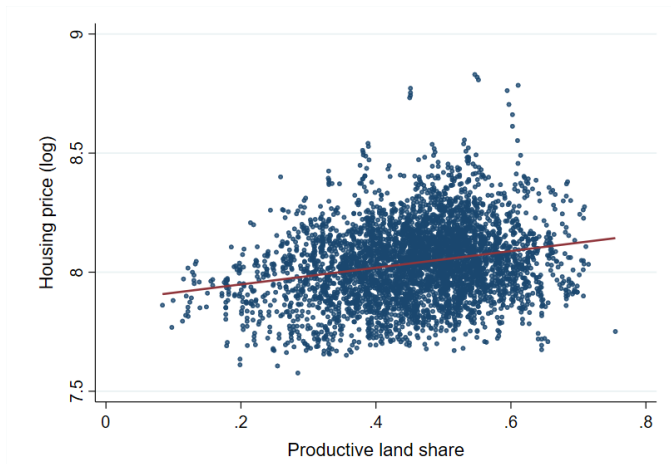
Motivating Facts

▶ Around 63% of land revenue has been collected from residential
  land

Empirical Strategy

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- Endogeneity
  - Reverse causality
  - Omitted variables

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  - ▶ The residential development is curtailed by the presence of steep-sloped terrain (Saiz, 2010)

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    - ► Two Ratio
        - ► the average slope of the city to the average slope of the province
        - ► the average slope of the city to 15 degrees

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  - Two Ratio
    - the average slope of the city to the average slope of the province
    - the average slope of the city to 15 degrees
  - Additional variation
    - the household registered population
    - the share of National Development Zones (NDZ)

Empirical Strategy

▶ 2SLS

$$Y_{it} = \beta_0 + \beta_1 \widehat{(L_p/L)}_{it} + \mathbf{X}_{it}\Phi + \mu_i + \theta_t + \varepsilon_{it}$$

|	Unemployment rate	log(wage)	log(price)	Unemployment rate	log(wage)	log(price)
	(1)	(2)	(3)	(4)	(5)	(6)
$(L_p/L)_{it}$	-0.1540***	1.0781***	1.0218**	-0.1249***	1.2990***	1.6745***
	(0.0506)	(0.2879)	(0.0128)	(0.0551)	(0.3603)	(0.5807)
Controls	YES	YES	YES	YES	YES	YES
City fixed effect	YES	YES	YES	YES	YES	YES
Year fixed effect	YES	YES	YES	YES	YES	YES
First-stage results for $(L_p/L)_{it}$						
$Ratio1_i \times Repop_{it}$	-0.1138***	-0.01089***	-0.1088***			
	(0.0186)	(0.0188)	(0.0038)			
$Ratio1_i \times NDZ_{it}$	0.0078**	0.0046	0.0047			
	(0.0032)	(0.0033)	(0.0033)			
$Ratio2_i \times Repop_{it}$				-0.1270***	-0.1200***	-0.1201**
				(0.0238)	(0.0241)	(0.0241)
$Ratio2_i \times NDZ_{it}$				0.0111**	0.0078*	0.0078*
				(0.0045)	(0.0045)	(0.0045)
Wk. instrument F stats	20.71	17.37	17.46	15.98	13.06	13.18
N	3,795	3,979	3,988	3,795	3,979	3,988

Benchmark Model

The Economy

- ▶ A unit measure of homogeneous worker-consumers consume final goods and housing to maximize their utility ▸

- ▶ There are search frictions in the labor market ▸

- ▶ One representative firm in each city produces final goods using labor and commercial land ▸

- ▶ The city developer converts residential land into housing ▸

- ▶ The regional government collects land revenue and rebates to household ▸

- ▶ No aggregate uncertainty, the steady-state equilibrium ▸
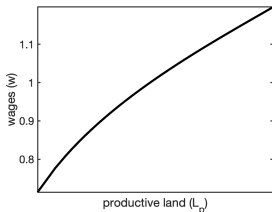
Model Results and Quantitative Analysis

Model Validation

▶ Increasing productive land use

  ▶ increases the tightness of the labor market
  ▶ increases the extra value that is created from job formation
  ▶ increases the household's expected income and reduces the supply of residential land
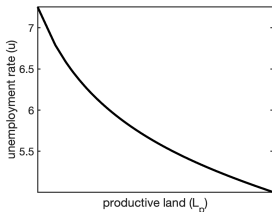
(a) Unemployment rate   (b) Wage   (c) Housing price
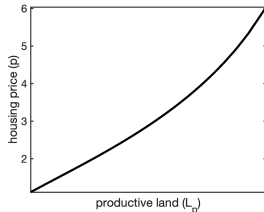
Quantitative Analysis

- Fitting the productive land share and TFP from data

Quantitative Analysis

▶ Fitting the productive land share and TFP from data

▶ Assume each cities i has its city-specific productivity A_i

$$A_i = \tilde{A}_i N_i^{\xi}$$

where $\tilde{A}_i$ denotes city-specific fundamental productivity and ξ captures the degree of the agglomeration effect

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▶ The indirect utility

$$\mathcal{U}_i = \frac{(1-\alpha)^{1-\alpha}\alpha^{\alpha}W_i p_i^{-\alpha}}{L_{0i}}$$

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$$\mathcal{U}_i = \frac{(1-\alpha)^{1-\alpha}\alpha^{\alpha}W_i p_i^{-\alpha}}{L_{0i}}$$

- Mobility of labor among cities ensures that each city provides the same level of utility, $\mathcal{U}_i = \mathcal{U}_j$

Calibration and Moments

Assigned		Calibrated/Estimated	
Parameter	Description	Parameter	Description
$\alpha = 0.30$	Housing expenditure share	$\gamma = 0.53$	Matching elasticity
$\sigma = 1/3$	1-Labor share	$\phi = 1.16$	Matching efficiency
$s = 0.07$	Separation rate	$\beta = 0.26$	Bargaining power
$r = 0.04$	Interest rate	$Z = 0.66$	Housing productivity
$\tau = 0.13$	VAT tax rates	$\eta = 0.69$	Housing elasticity
$\xi = 0.08$	The degree of the agglomeration	$\gamma_0 = 1.93$	Vacancy cost
		$b = 0.24$	Unemployment benefits

Moment		
	Data	Model
Tightness θ	1.47	1.47
Replacement rate $b/mean(w)$	18.6%	18.6%
Unemployment rate u	4.89%	4.75%
Housing price wage ratio p/w	3.33	3.27
Residential land revenue share	63.16%	63.30%

▸ parameters estimation
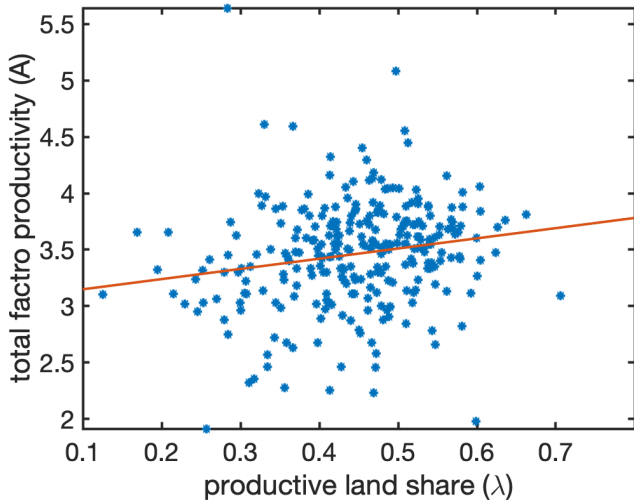
TFP and Land Share

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Table 1: The Effect of Reallocating Land Share

	benchmark	reallocation	gain from reallocation
	x	x^*	$\log(x^*/x) \times 100\%$
	(1)	(2)	(3)
Output Y	2.57	2.61	0.65
Consumption C	4.32	4.36	0.50
Housing H	0.44	0.45	0.80
Unemployment rate u	4.75	4.79	0.18
Wage w	1.32	1.33	0.32
Housing price p	4.45	4.66	1.97
Welfare $\mathcal{U}$	0.62	0.63	0.27

Uniform Land Share: Welfare
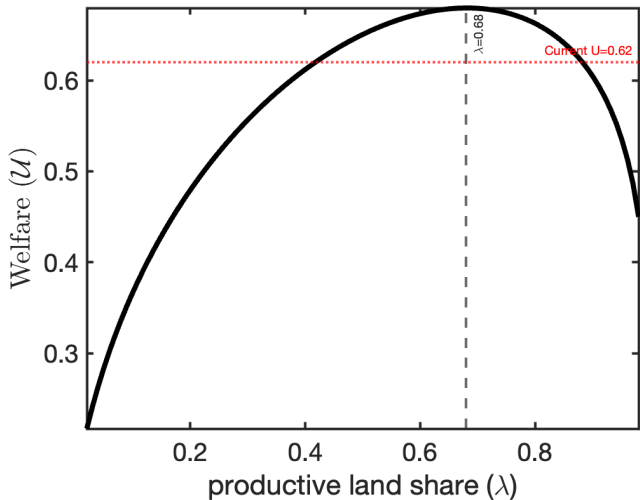
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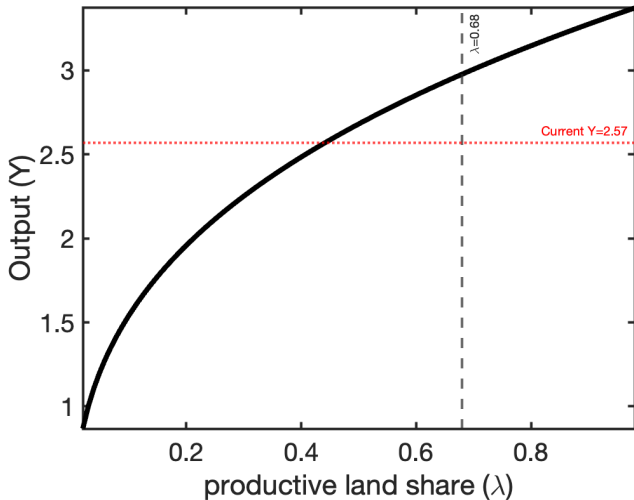
Future Work

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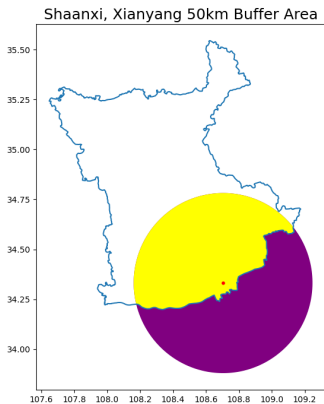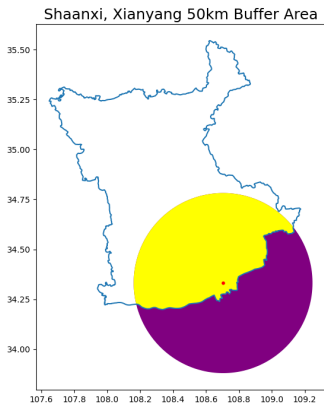
- The ratio of residential land should be restricted due to the steepness of the terrain.

Conclusion

► Empirics

  ► A 10% increase in the share of commercial land

    ► reduces the unemployment rate by 29.6%

    ► increases the wages by 11.06%

    ► increases the housing prices by 10.25%

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- Findings
    - Increasing the productive land share would reduce unemployment rates and raise wages and housing prices
    - Reallocating the land use share with the rank of the city productivity accordingly would lead to Pareto improvement
    - Uniform land use scheme can improve welfare by around 3.67%

Appendix

Summary Statistics

	Observations	Mean	Std. Dev.	Min	Max
$(L_p/L)_i t$	4,465	0.456	0.107	0.084	0.755
Unemployment rate	4,427	0.052	0.033	0.001	0.323
log(wage)	4,703	10.271	0.646	8.641	11.917
log(price)	4,406	7.982	0.665	5.124	10.899
Population density	4,711	4.270	3.270	0.050	27.070
ln(GDP per capita)	4,710	15.961	1.112	12.643	19.605
ln(FDI)	4,528	9.495	2.137	0.000	14.941
Size of government	4,705	0.121	0.118	0.007	2.349

▸ Back

The Household

▶ The representative worker-consumers maximize their utility

$$\mathcal{U}(c, h) = c^{1-\alpha} h^{\alpha} \tag{1}$$

subject to the budget constraint

$$c + p \times h = W$$

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▶ The demand for final goods

$$c = (1-\alpha)W$$

▶ The demand for housing

$$h = \frac{\alpha W}{p}$$

Labor Market

▶ Matching function

$$M(u,v) = \phi u^{1-\gamma} v^{\gamma} \tag{2}$$

    ▶ ϕ represents the efficiency of the matching process and γ denotes the matching elasticity

    ▶ $\theta = v/u$ denotes the tightness of the labor market

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  - ϕ represents the efficiency of the matching process and γ denotes the matching elasticity
  - $\theta = v/u$ denotes the tightness of the labor market

- In the steady state, unemployment inflows equals unemployment outflows

$$s(1 - u) = \theta q(\theta) u$$

$$\Rightarrow u = \frac{s}{s + \theta q(\theta)} \tag{3}$$

  - s denotes separation rate

▸ back

The Firm

▶ The representative firm in a city uses productive land and labor to produce consumption goods

$$Y = AN^{1-\sigma}L_p^{\sigma} \tag{4}$$

  ▶ A is the city-level productivity, N is the city-level employment, and L_p is the quantity of productive land

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▶ Let $y = Y/N$ and $\ell_p = L_p/N$, the demand for productive land

$$q_p = (1 - \tau)A\sigma\ell_p^{\sigma-1} \tag{5}$$

where τ denotes a sales tax

Job Creation

▶ Value of a firm posting a vacancy

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▶ The labor demand curve

$$(1 - \tau)A\ell_p^\sigma - q_p\ell_p - w - \frac{(r + s)\gamma_0}{q(\theta)} = 0 \qquad (8)$$

   ▶ γ_0 denotes the cost of creating a vacancy

Wage Determination

- The expected income

$$W = \theta q(\theta) w + [1 - \theta q(\theta)] b$$

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▶ The wage equation

$$w = (1-\beta)b + \beta((1-\tau)A\ell_p^\sigma - q_p\ell_p + \theta\gamma_0) \qquad (9)$$

  ▶ β denotes the worker's wage bargain power

Housing Market

- A residential housing developer produces houses

$$H = ZL_r^\eta \tag{10}$$

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▶ Housing market clearing

$$ZL_r^\eta = h \times L_0$$

  ▶ L_0 denotes city population

▶ back

The Regional Government

▶ A regional government collects revenue from land leases and taxes, and transfer T to its citizens

$$T = q_p L_p + q_r L_r + \tau Y \tag{12}$$

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▶ Let $L = L_p + L_r$ denote the overall land and normalize to unity
  ▶ let $\lambda = L_p/L$ denote the share of land use for commercial purposes
  ▶ the allocation of commercial land L_p and residential land L_r are governed by the parameter λ

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Equilibrium

- A steady-state competitive equilibrium consists of a series of
  - prices: rent of productive land q_p, rent of residential land q_r, housing price p, and wage w

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  - allocations: output Y, housing H, productive land L_p, residential land L_r, city population L_0, and workers N
  - such that
    - household, production firm, and housing developer are optimize
    - labor, land, housing, and goods markets are clear

Calibration Strategy

▶ **Matching Elasticity and Efficiency**

$$\ln e_{it} = \gamma \ln \theta_{it} + a_i + f(trend) + \varepsilon_{it}$$

where $e_{it} = M_{it}/U_{it}$ is employment rate, $\theta_{it} = V_{it}/U_{it}$ is the labor market tightness

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▶ **Labor Bargaining Power**

$$w_{it} = (1 - \beta)b + \beta p_{it} + \beta \gamma_0 \theta_{it} + c_i + c_t + \varepsilon_{it}$$

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▶ **Housing Elasticity and Productivity**

$$\ln H_{it} = \ln Z + \eta \ln(1 - \lambda_{it}) + h_i + h_t + \varepsilon_{it}$$

Model Parameters Estimation

	Employment Rate		Real Wage		Housing Supply	
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	2SLS	OLS	2SLS	OLS	2SLS
Tightness	0.8067***	0.5258***	0.8255**	0.7736***		
	(0.0691)	(0.1831)	(0.3868)	(0.2849)		
Unemployment Benefits			0.1509***	0.6402***		
			(0.0265)	(0.0554)		
Labor Productivity			0.8491***	0.3598***		
			(0.0265)	(0.0554)		
Residential Land Share					1.2779***	1.6852***
					(0.2181)	(0.4055)
$f(Trend)$	YES	YES				
Region FE	YES	YES	YES	YES	YES	YES
Year FE			YES	YES	YES	YES
N	308	280	297	270	3,025	2,750

▸ back