The Fiscal Roots of China's Unbalanced Growth

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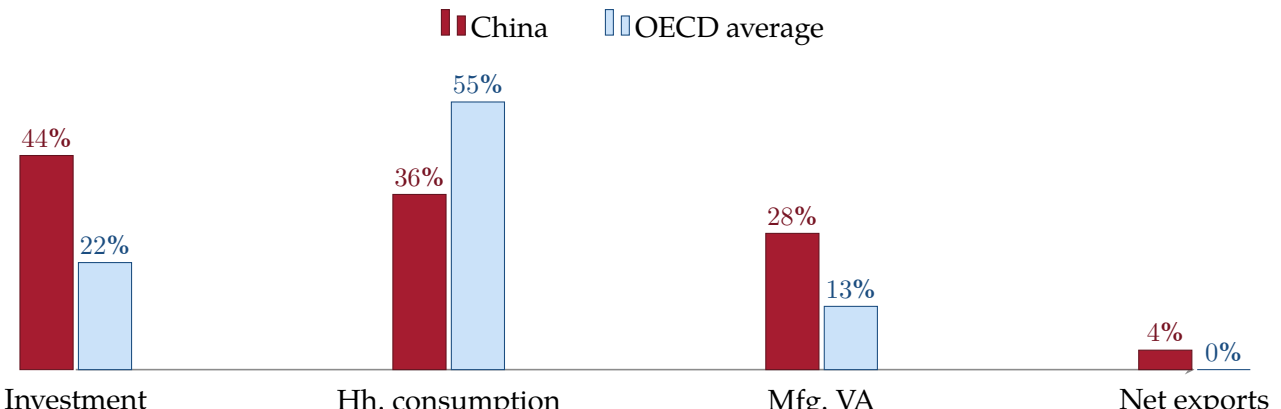
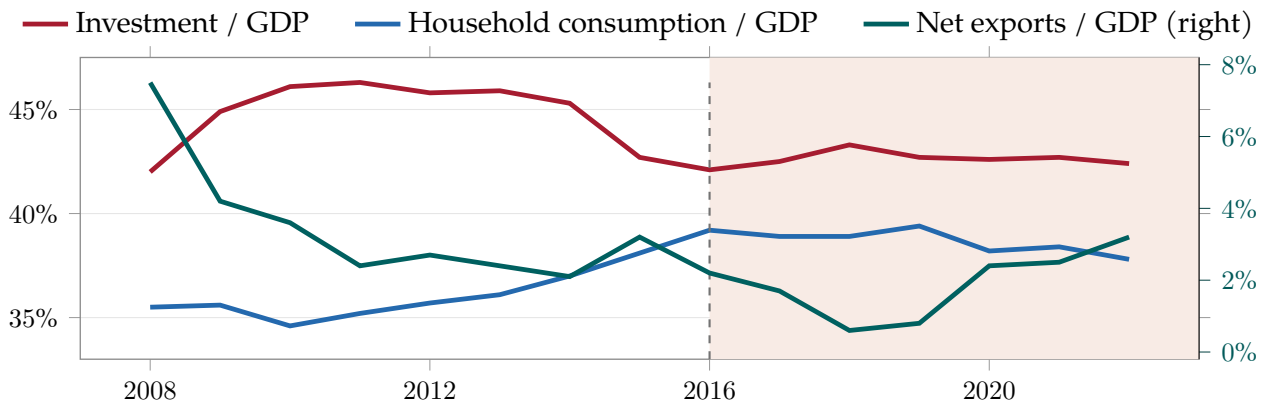
China's Unbalanced Growth



Shares of GDP: manufacturing as value added; net exports of goods & services.

China over-invests, under-consumes, and over-produces:
a structural, not transitory, imbalance

China's Unbalanced Growth



China, % of GDP (World Bank WDI). Shaded: 2016 onward.

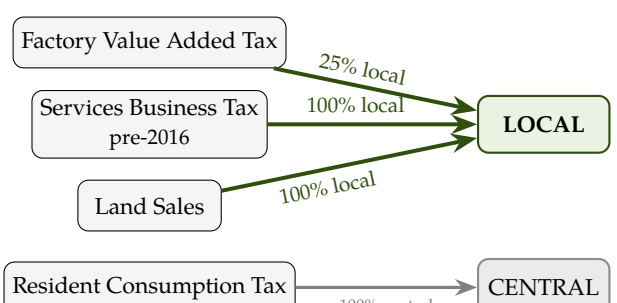
After 2016, the rebalancing stalls:
consumption flattens, investment stops falling, surplus comes back

This Paper

- **Question**: why does China favor investment/producers over consumption/residents?
- **Answer**: its local governments face *origin-based* taxes
  - origin-based v.s. destination-based
  - production pays their budgets, consumption does not
  - preference over specific types of firms (productivity v.s. exportability)
  - even a benevolent government supports (low-productivity) factories, not amenities

China's Architecture: Revenue Follows Factories

- **Principle**: origin-based taxation rewards production; destination-based rewards consumption
- **China is origin-based**; 1994 vertical imbalance makes it bite ($>80\%$ spending, $<50\%$ revenue)
- The local government income composition:

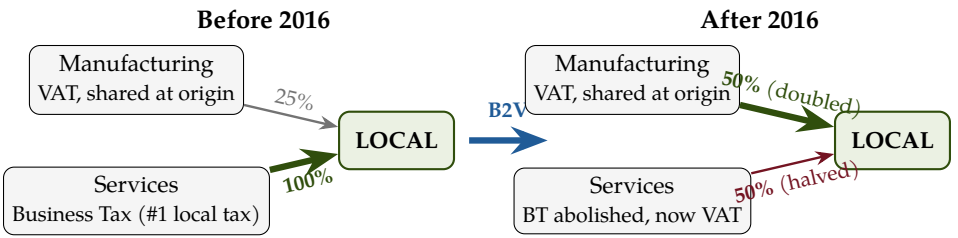


Why the Tilt Is Rational: What the Budget Prices

- Firms differ in **productivity** z, **exportability** ϕ, **land demand** ℓ
  - export to both other domestic regions and foreign countries
- A planner ranks by z; an origin-based budget prices the other two:
  - **Tax base** (ϕ): exportable production expandable while local sales capped
  - **Land finance** (ℓ): anchors land values (conveyance today, collateral tomorrow)
- Origin retention makes local governments care less about producers' actual productivity, and more about their impacts on tax base and land finance

2016: The B2V Reform Re-Prices Production

full rollout May 2016; pilots from 2012



- Service stake halves, manufacturing doubles: exportability and land demand matter more
- A **war of attrition**: compete for similar firms
- Only external demand absorbs the push (the 2016 stall and come back of surplus)
- Per city: half the BT base lost, a quarter more VAT gained; service-heavy lose most (the DiD treatment)

What We Do in This Paper

1. **Model**: spatial equilibrium with the central–local fiscal structure
2. **Quantification**: fiscal contributes to 17% of consumption, 72% of land discount, 95% of zombie firms, 39% of net export
3. **Counterfactual**: *fiscal is the root*; destination tax reform and 2024 subsidy ban raise welfare
4. **Empirical test**: 540,000 parcels sales, and B2V-squeezed cities deepen discounts

Is This Just Promotion Tournaments?

- **Mandarin model**: promotion on measured performance Li & Zhou (2005); Xu (2011); Song & Xiong (2024)
  - **Direction**: GDP is sector-blind; why factories and land discounts?
  - **Timing**: careers weakened after 2008; why does rebalancing stall in 2016?
  - **Aggregate**: a GDP race is demand-neutral; why a persistent surplus?
- **Our interpretation**: careers and debt amplify
- Even with zero political biases, the fiscal ranking alone distorts

Model

Environment

- Locations $i = 1, \ldots, N$ plus a RoW export market F
- Residents are **immobile** (hukou), $L_i \equiv 1$
  - no Tiebout margin: amenity cannot attract residents; cities compete for firms only
  - extension: labor skill heterogeneity and mobility
- One differentiated good; single sector with different firm characteristics
- Factor markets:

$$\begin{aligned} \text{labor:} \quad & N_i^s(w_i) = N_i^d(w_i) && \text{(local clearing)} \\ \text{capital:} \quad & r_i = r^* && \text{(world interest rate)} \\ \text{land:} \quad & T_i^d(q_i) = \bar{T} && \text{(fixed endowment; } q_i \text{ clears locally)} \end{aligned}$$

- City ex-ante heterogeneity is only the aggregate productivity h_i

Households

- Utility (amenity complements private consumption; $\rho < 0$):

$$U_i = \left[\chi C_i^{\rho} + (1-\chi) A_i^{\rho}\right]^{1/\rho} + \psi v(1 - N_i)$$

  - A_i is the resident-side public good: education / health expenses

- CES consumption over domestic origins $o \in \{1, \ldots, N\}$:

$$C_i = \left(\sum_o \int c_{io}(j)^{\frac{\varepsilon-1}{\varepsilon}} dj \right)^{\frac{\varepsilon}{\varepsilon-1}}$$

- RoW buys exports, supplies nothing
- Budget: $P_i C_i = w_i N_i + \Pi_i$

Firms: Technology and Type

- Type $\omega \equiv (z, \phi, \ell)$: productivity, exportability, land intensity
- Unit cost: h_i scales every type; land share rises with ℓ; ϕ is trade-only

$$c_i(\omega; d) = \frac{1}{h_i z} w_i^{\alpha_N(\ell)} (r^*)^{\alpha_K(\ell)} \tilde{q}_i(d)^{\alpha_T(\ell)}, \qquad \tilde{q}_i(d) = q_i(1-d)$$

  - $\alpha_T'(\ell) > 0$, and α_N, α_K shrink proportionately
  - land-hungry plants are heavy-asset producers
  - h_i lowers effective cost
- Variable profit from market n (monopolistic competition, elasticity ε):

$$\pi_{ni}(\omega; d) = \frac{1}{\varepsilon} \left(\frac{\varepsilon}{\varepsilon - 1} \frac{\tau_{ni} c_i}{P_n} \right)^{1-\varepsilon} E_n$$

- Operating fixed cost $f > 0 \Rightarrow$ market profit can be negative
  - $f > 0$ is why some firms need subsidy

The Support Package

- Baseline instrument: the **land discount** only
- VAT rebates are in extension
- Unsupported profit (full land price, $d = 0$) vs. profit at the posted discount:

$$\pi_i^0(\omega) = \sum_n \pi_{ni}(\omega; 0) - f_i + \max\{\pi_{Fi}(0) - f_x,\ 0\}$$
$$\pi_i(\omega; d) = \sum_n \pi_{ni}(\omega; d) - f_i + \max\{\pi_{Fi}(d) - f_x,\ 0\}$$

- Firm operates in i only if $\pi_i(\omega; d) \geq 0$
- Zombie firms: would die at full q, alive with the discount $(\pi_i^0 < 0 \leq \pi_i(d))$

Location Choice

- Firm of type ω picks i to max $\pi_i(\omega; d) + \nu\varepsilon_i$, where ε_i i.i.d. Gumbel

$$\lambda_i(\omega; d) = \frac{\exp\big(V_i(\omega; d)\big)}{1 + \sum_k \exp\big(V_k(\omega; d)\big)}, \qquad V_i(\omega) = \frac{\pi_i(\omega; d)}{\nu}$$

- city i is available only if $\pi_i \geq 0$
- different types have different profits and therefore different location densities

Trade Costs and Export Selection

- Home sales are frictionless: $\tau_{ii} = 1$
- Selling *anywhere else* — another prefecture or RoW — is one external margin:

$$\tau_{ni}(\phi) = \tau_{D0}\, e^{-\phi} \quad (n \neq i), \qquad \tau_{Fi}(\phi) = \tau_{F0}\, e^{-\phi}$$

- Baseline τ_{D0} is common across pairs; geographic $\tau(\text{dist}_{ni})$ is an extension
- RoW demand is an **exogenous** CES shifter:

$$\text{MA}_F(\phi) = B_F\, \tau_F(\phi)^{1-\varepsilon}$$

- Exporter iff $\pi_i^{\text{ext}}(\phi) \geq f_x$ (external = other cities + RoW, not RoW-only)
- Nontradable limit: all external icebergs $\to \infty \Rightarrow$ revenue capped by local spending

Fiscal Architecture and Local Budget

- Retention (η_P, η_R) set by statute: $\mathcal{T}_i^P = \tau_v \, \mathrm{VA}_i$, $\mathcal{T}_i^R = \tau_c \, C_i$
- Local chooses $(A_i, \ell_i^*, d_i, B_i)$ with the following budget constraint:

$$\eta_P \, \mathcal{T}_i^P + \eta_R \, \mathcal{T}_i^R + R_i^{\text{land}}(d) + B_i = A_i + \underbrace{\int d_i \, q_i \ell \, \mathbf{1}\{\ell \geq \ell_i^*\} \, \lambda_i(\omega) \, dG(\omega)}_{\text{forgone land revenue}} + (1 - \lambda_B)(1 + r^*) B_i$$

- $\lambda_B = \text{Prob}(\text{this official does not repay}) = \text{term-out}$. Distortion $\lambda_B(1 + r^*)B_i$ hits the successor
- Cap $B_i \leq \theta q_i \bar{T}$ binds whenever $\lambda_B > r^*/(1 + r^*)$
- "who borrows, repays": $\lambda_B = 0$

Government Objectives: Central vs. Local

Local i chooses A_i, ℓ_i^*, d_i, B_i

$$\Omega_i^{\mathrm{L}} = U_i + \kappa\, \mathcal{G}_i - \tfrac{\xi}{2}\, b_i^2$$

- U_i: local resident utility (amenity + private C_i)
- $\mathcal{G}_i = Q_i/\bar{Q}$: career on **local total firm output**; baseline $\kappa > 0$
- ξ: leverage discipline on $b_i = B_i/Y_i$
- Faces local budget and $B_i \leq \theta q_i \bar{T}$

Central architecture by statute

$$\Omega^{\mathrm{C}} = \sum_{i=1}^{N} \omega_i\, U_i$$

- National welfare over all localities
- Does not internalize $\mathcal{G}_i$ or the leverage penalty
- (η_P, η_R) inherited, not optimized; the counterfactuals solve its reform problem

Equilibrium

Timing: $(\eta_P, \eta_R, \lambda_B)$ by statute $\rightarrow$ official posts $(A_i, \ell_i^*, d_i, B_i)$ $\rightarrow$ firms locate $\rightarrow$ prices clear.

Definition (spatial equilibrium)

Given $(\eta_P, \eta_R, \lambda_B)$ and $\{h_i\}$, common $\bar{T}$: prices $\{w_i, q_i, P_i\}$, allocations $\{C_i, N_i, \lambda_i(\cdot), \mathcal{E}_i\}$, policies $\{A_i, \ell_i^*, d_i, B_i\}$ s.t.

1. **Households** choose CES consumption and labor given (w_i, P_i, A_i)
2. **Firms** markup $\frac{\varepsilon}{\varepsilon-1}$; operate iff $\pi_i(d) \geq 0$; export iff $\pi_i^{\text{ext}} \geq f_x$; locate by logit $\lambda_i(\omega)$
3. **Local governments**: $(A_i, \ell_i^*, d_i, B_i)$ Nash, internalizing $(1-\lambda_B)(1+r^*)B_i$, s.t. $B_i \leq \theta q_i \bar{T}$
4. **Central governments**: rebate all central taxes to households equally
5. **Markets clear**: labor locally; land $T_i^d(q_i) = \bar{T}$; goods via CES P_n; capital at r^*

The Land-Discount Frontier

- In type space (z, ϕ, ℓ): the surface where a land discount is just worth posting
- Net fiscal return of discounting type ω (give d iff $\text{MFR}_i^d \geq 0$):

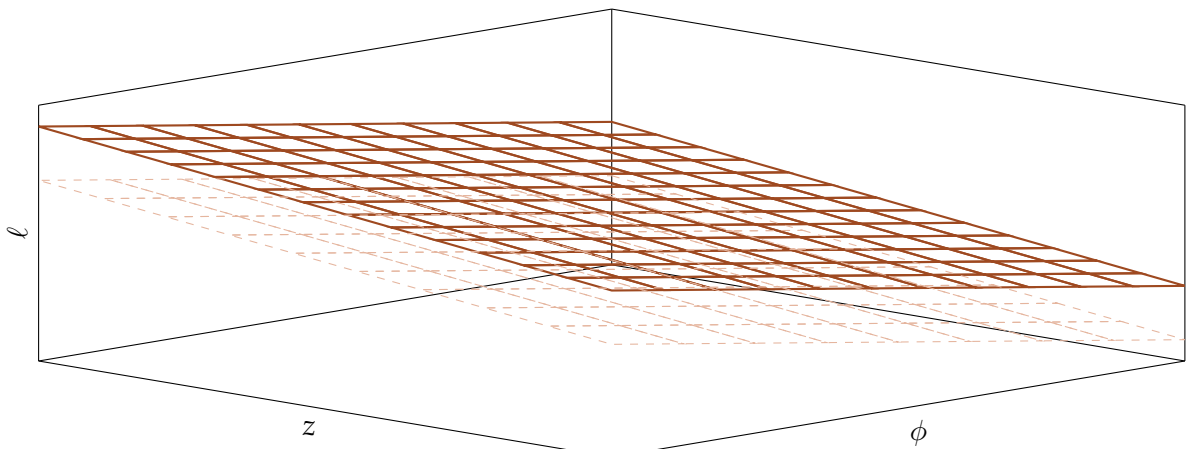
$$\text{MFR}_i^d(\omega) = \underbrace{\eta_P \frac{\partial \mathcal{T}_i^P}{\partial d}}_{\text{extra retained VAT}} + \underbrace{\mu_i \theta \bar{T} \frac{\partial q_i}{\partial d}}_{q \text{ up} \Rightarrow \text{more borrowing room}} - \underbrace{q_i \ell}_{\text{forgone land revenue}}$$

- MFR^d rises in land intensity $\ell \Rightarrow$ a threshold

$$d(\omega) = d_i \, \mathbf{1}\{\ell \geq \ell_i^*(\omega; h_i)\}$$

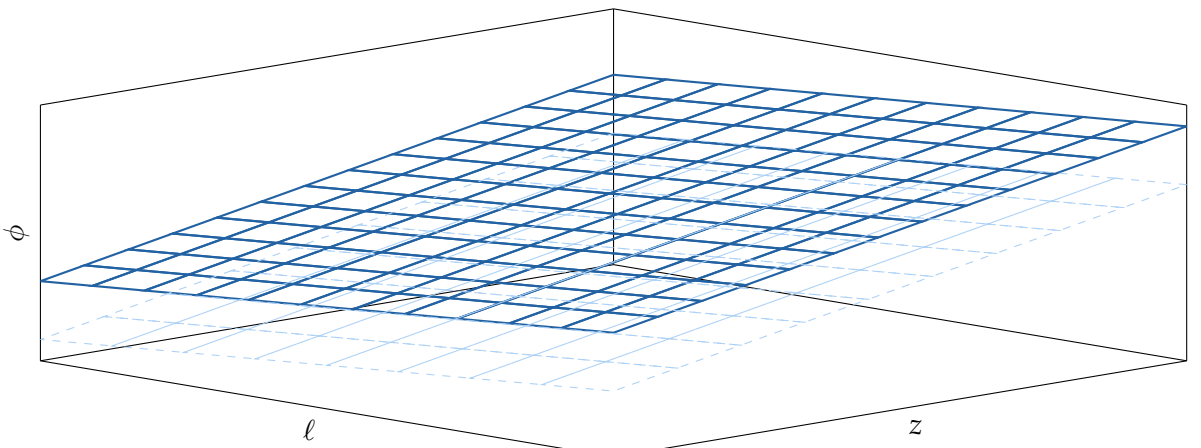
- Low h_i raises unit cost $\Rightarrow$ frontier shifts down, more types eligible: $\partial \ell_i^* / \partial h_i > 0$

Land Discount Surface



$d > 0$ above the wireframe: $\ell \geq \ell_i^*(\omega; h_i)$. Dashed: lower h_i (surface down).

Extension: VAT Rebate Surface



Lemma 1: Land-Discount Cutoff

The two figures are the proof. Monotone MFR$_i^d$ makes threshold support optimal:

$$d(\omega) = d_i \, \mathbf{1}\{\ell \geq \ell_i^*(\omega; h_i)\}, \qquad \frac{\partial \ell_i^*}{\partial h_i} > 0$$

- Official chooses eligibility ℓ_i^* and intensity d_i
- Backward cities (low h_i): surface down, more types eligible
- Extension: the same argument in ϕ delivers a rebate cutoff ϕ_i^*

Lemma 2: Architecture Creates Conflict

Benevolent government, $\kappa = \xi = \lambda_B = 0$. Per-yuan returns ($\varrho_i$ = shadow price of public funds):

$$\text{MFR}_i^P = \underbrace{\eta_P \frac{\partial \mathcal{T}_i^P}{\partial x_i}}_{\text{VAT on expandable base}} - 1, \quad \text{MFRA}_i = \underbrace{\frac{1}{\varrho_i}\frac{\partial U_i}{\partial A_i}}_{\text{utility, in yuan}} + \underbrace{\eta_R \frac{\partial \mathcal{T}_i^R}{\partial A_i}}_{\text{bounded resident base}} - 1$$

$\text{MFR}_i^P > \text{MFRA}_i$ is *not* automatic. It holds iff

$$\frac{1}{\varrho_i}\frac{\partial U_i}{\partial A_i} < \eta_P \frac{\partial \mathcal{T}_i^P}{\partial x_i} - \eta_R \frac{\partial \mathcal{T}_i^R}{\partial A_i}$$

- Needs $\eta_P > \eta_R$, expandable production / bounded resident base (Lemma 3), and ϱ_i high enough
- Slack budget (small ϱ_i): amenity's utility return can overturn the fiscal gap

Lemma 3: Exportability Matters

Amenity feeds **local** demand E_i. High-ϕ producers supply a **larger** market (other cities + RoW).

$$\underbrace{\sum_j p_j y_j = E_i}_{\text{local pie is pinned}} \;\Rightarrow\; \left.\frac{\partial \mathcal{T}_i^P}{\partial x}\right|_{E_i} = 0 \qquad \pi_i^{\text{ext}} \geq f_x \;\Rightarrow\; \frac{\partial \mathcal{T}_i^P}{\partial x} > 0$$

- Marginal benefit of raising local demand declines *faster*: extra amenity / local sales congest a small, fixed E_i
- Marginal benefit of supplying the larger market declines *slower*: other-city + RoW demand is thick, so another unit is new base
- Exportability ϕ is what puts a firm on the slow-declining margin

Subsidy-Dependent Share

- Subsidy-dependent set: would die at full land price, alive with the discount

$$\mathcal{D}_i = \left\{\omega : \ \pi_i^0(\omega) < 0 \ \leq \ \pi_i(\omega; d)\right\}$$

- Share among active firms (ASIF loss-while-operating proxy):

$$\text{SDS}_i = \frac{\int_{\mathcal{D}_i} \lambda_i(\omega)\, dG(\omega)}{\int_{\{\pi_i(\omega;d)\geq 0\}} \lambda_i(\omega)\, dG(\omega)}$$

- Baseline "overcapacity" := SDS_i (and its aggregate)

Lemma 4: Subsidy-Dependent Firms

The land return rises with production retention:

$$\frac{\partial \ell_i^*}{\partial \eta_P} < 0, \qquad \frac{\partial \text{SDS}_i}{\partial \eta_P} > 0$$

- The B2V direction: raise η_P and the zombie margin widens
- Land–debt amplifier: if $\lambda_B > r^*/(1+r^*)$, support raises q_i, the cap loosens, support gets cheaper
- Setting $\lambda_B = 0$ (debt follows the official) shuts the accelerator, not $\eta_P > \eta_R$
- Amenity mints no collateral, so the loop is production-specific

Higher production retention manufactures subsidy dependence.

Proposition: The Center's Optimal Architecture

Symmetric cities, $\kappa = \xi = \lambda_B = 0$, fixed aggregate firm mass:

$$\frac{\partial \Omega^{C}}{\partial (\eta_P - \eta_R)} < 0 \quad \Longrightarrow \quad \text{every central optimum has } \eta_P \leq \eta_R$$

- Symmetric support cancels in the location game but burns amenity and sustains loss-makers
- So the center should not fund the war; the origin statute is legacy, not optimum
- The model's own central optimum removes the production premium

Quantitative Results

Calibration (1/2): External, Never Fitted

Symbol	Description	Value	Source
η_P	Local production-side retention	**0.50**	Post-2016 shared VAT
η_R	Local resident-side retention	**0.18**	Halved BT legacy
τ_v	Statutory VAT rate	0.17	Fiscal accounts
τ_c	Resident-side tax rate (consumption / services)	0.08	Fiscal accounts
r^*	World interest rate	0.03	Small-open-economy norm
ε	CES / Armington elasticity	4.0	Trade literature
α_N, α_K	Labor, capital cost shares	0.55, 0.38	IO tables
θ	Land-collateral factor	0.60	LGFV / land-finance practice
θ_z	Pareto firm size (ASIF 2011–15)	1.13	Own ASIF fit; Axtell 2001; Brandt et al. 2012
ψ	Labor–leisure shifter	1.85	GHH; Frisch ≈ 0.65 at w=1 Chetty 2012
ξ	Leverage penalty on B/Y	0.56	Soft at $b \approx 0.13$; hard cap is θ
λ_B	Term-out probability (debt distortion)	0.70	Tenure / LGFV; Li & Zhou 2005; Bai–Hsieh–Song 2016

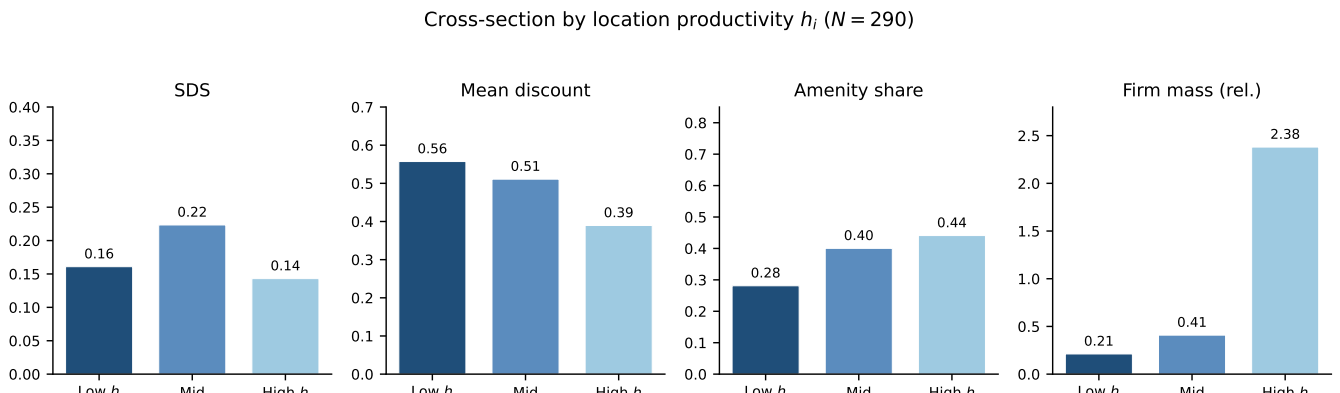
Calibration (2/2): Internal — What the SMM Estimates

Param	Role	Est.
(f, f_x)	Operating / external fixed costs	11.8, 21.0
B_F	RoW demand shifter (exogenous CES)	**0.076**
$(\tau_{F0}, \mu_\phi, \sigma_\phi)$	Export iceberg / exportability	6.48, -0.76, 0.80
$(\bar{d}, \nu)$	Land-discount intensity / location scale	0.58, 0.89
$(\chi, \rho, \sigma_\ell)$	CES weight on C / complementarity / land-intensity SD	0.49, -1.34, 0.65
κ	Career on firm output	0.40 in the SMM window

Spatial Model Fit: National + Cross-City Moments

Moment	Data	Model
National aggregates		
Export participation / intensity	0.215 / 0.505	0.375 / 0.627
SDS / SD of log output	0.096 / 1.124	0.166 / 0.824
Mean land discount (vs p90)	0.476	0.356
Amenity share / retail / GDP	0.197 / 0.364	0.411 / 0.493
Bond debt / GDP (2016–19)	0.130	0.105
Fiscal gap (exp − rev)/exp	0.536	0.295
Cross-city (by h_i, not $\bar{T}$)		
Mean discount, high-export cities	0.393	0.454
corr(h, SDS) / corr(h, discount) / corr(h, firms)	0.047 / −0.30 / 0.50	0.04 / −0.87 / 0.88

Result 1: Productivity h_i Shapes Local Policy



N=290 spatial equilibrium, terciles of h_i (2011 GDP per capita). High-h: denser firms, shallower discounts, higher amenity. SDS peaks in the mid tercile; low-h cities run the deepest discounts.

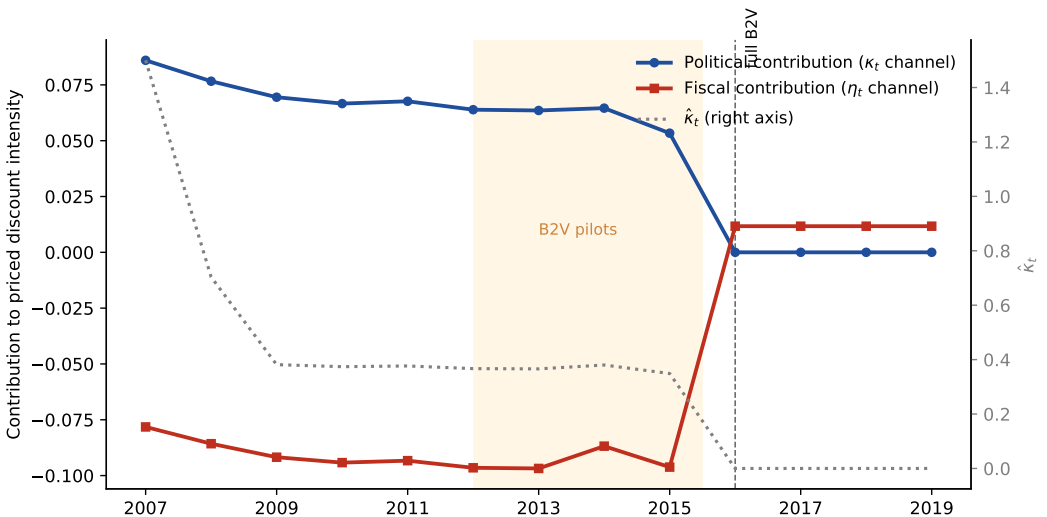
Result 2: How Much of the 2016–22 Stall Is Fiscal?

	Data Δ	Fiscal (η)	Fiscal share
Consumption C/Y	-1.4pp	-0.23pp	**17%**
Land discount d	$+3.2$pp†	$+2.3$pp	**72%**
SDS (yb. proxy)	$+8.7$pp	$+8.3$pp	**95%**
Net exports NX/Y	$+1.0$pp	$+0.37$pp	**39%**

Result 3: The Driver Rotates from Political to Fiscal

Regime	(η_P, η_R)	$\hat{\kappa}$	Discount data / model	Shapley vs ranking-neutral Political (κ)	Fiscal (η)
2007–08 tournament	(0.25, 0.36)	1.5	0.518 / 0.510	**0.055**	−0.047
2009–15 post-crisis	(0.25, 0.36)	0.4	0.473 / 0.493	**0.046**	−0.055
2016–19 post-B2V	(0.50, 0.18)	0.0	0.473 / 0.514	0.000	**0.012**

Result 3: The Rotation, Year by Year



Annual $\hat{\kappa}_t$ inverted from that year's parcel discounts given statutory η_t. Pre-B2V: political > 0, fiscal < 0 (resident tilt restrains). Post-2016: $\hat{\kappa}_t$ corners at 0; architecture floor 0.51 sits above the data.

Policy CF: Banning the Instruments (2024)

Decree 783 (eff. Aug 2024) bans selective tax preferences, fiscal rewards, and preferential land pricing; the 2014 attempt was suspended within six months.

	Welfare U^{CES}	Local payoff Ω^{L}	SDS	Discount	Amenity	Own rev.
Baseline	0.168	0.624	0.150	0.463	0.260	9.26
Instrument ban	**0.173** $(+3.2\%)$	**0.405**	0	0	0.269	9.21
Destination reassignment	0.176 $(+4.8\%)$	0.610	0.099	0.277	0.254	8.12
Ban + destination	0.181 $(+7.7\%)$	**0.692**	0	0	0.257	8.22

- **Disarmament**: welfare $+3.2\%$, own revenue intact; SDS $0.15 \to 0$: zombies exit
- But local payoff collapses $(0.62 \to 0.41)$: **incentive-incompatible**
- Ban + reassignment raises both: removes expression and motive

Micro Evidence

The 2016 B2V Reform Shock

- **Data**: 540,000+ industrial land sales, 280 cities, 2007–2019
- **Outcome**: price above the statutory floor (RMB/m^2)
- **Treatment**: 2011-weighted exposure to the 50:50 VAT switch

$$\text{Exposure}_c = \frac{0.5 \times \text{BizTax}_{c,0} - 0.25 \times \text{VAT}_{c,0}}{\text{Budget}_{c,0}}$$

- **Spec**: $\text{Ind. Land Diff.}_{ict} = \beta\,(\text{Exposure}_c \times \text{Post}_t) + \alpha_c + \delta_t + \mathbf{X}'_{ict}\gamma + \varepsilon_{ict}$
- Continuous DiD; $\text{Post}_t = \mathbf{1}\{t \geq 2016\}$; city and year FE; SE clustered by city

Exposed Cities Compress Industrial Land Prices — in Ordinary Prefectures

Ind. Land Diff. (RMB/m^2)	(1)	(2)	(3)	(4)	Non-core	Core
Exposure × Post	**−320.7****	**−359.4****	**−164.7*****	**−109.1****	**−155.7*****	−287.1
	(149.7)	(161.9)	(52.3)	(52.1)	(51.4)	(457.0)
City & Year FE	YES	YES	YES	YES	YES	YES
Parcel controls	NO	YES	YES	YES	YES	YES
Industry & leader FE	NO	NO	YES	YES	YES	YES
City macro	NO	NO	NO	YES	NO	NO
Observations	518k	448k	448k	423k	373k	75k

Amplifier: Career Horizon Scales κ, Does Not Create It

Exposure × Post	Secretary $<$**58**	Secretary $\geq$**58**
coefficient	$-$**125.5** (**p$<$.05**)	$+$**241.8** (**p$<$.01**)

- Young secretaries deepen d when squeezed; those past 58 raise prices for cash

Conclusion

- **Question**: why do local governments favor producers over residents?
- **Mechanism**: origin-based tax sharing, amplified by land finance and debt
- **Structural**: a multi-city spatial model; land discounts and subsidy-dependent firms respond to the sharing rules
- **Micro**: the 2016 reform moves industrial land prices in exposed ordinary prefectures
- **Policy**: a destination-based and subsidy ban raises welfare
- **Beyond China**: the tax base decides whom governments compete for — residents or factories