Fiscal Architecture, Local Production Bias, and Aggregate Imbalance in China*

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Abstract

Why do Chinese local governments favor producers over residents? We argue that the answer lies in tax assignment rather than political tournaments alone. Under origin-based taxation, localities retain value-added tax revenue generated by production but have no comparable claim on household consumption, so the fiscal system ranks production above welfare. We formalize this mechanism in a dynamic spatial general equilibrium model with land-backed borrowing and political incentives, disciplined by a panel of 283 Chinese prefectures from 1998 through 2019. A structural decomposition shows that fiscal incentives now dominate: the fiscal wedge accounts for 80% of infrastructure investment variation post-2016, up from 45% pre-2009, while the political wedge has fallen to 15% of its earlier peak. Policy counterfactuals show that transfers alleviate fiscal scarcity but do not change incentives; only tax reassignment toward destination-based taxation durably rebalances local spending. Reduced-form evidence from more than 540,000 industrial land transactions corroborates the mechanism: cities with greater fiscal exposure to the 2016 Business Tax-to-value-added tax reform compressed industrial land prices significantly, with the response concentrated among promotion-motivated officials and reversing sign at the retirement threshold.

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*All remaining errors are our own.

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1 Introduction

Why do Chinese local governments so often behave as if producers matter more than residents? Across prefectures, officials build industrial parks, extend infrastructure to manufacturing zones, and discount industrial land to attract firms, while household-oriented spending and service-sector development receive weaker support. The standard explanation emphasizes political tournaments: officials chase output because promotion depends on GDP performance (Hongbin Li and Li-An Zhou, 2005; Eric Maskin, Yingyi Qian and Chenggang Xu, 2000; Zheng Song and Wei Xiong, 2024; Chenggang Xu, 2011). This paper argues that tournaments matter, but the deeper and increasingly dominant cause is tax assignment. Under China's origin-based fiscal system, production generates locally retained revenue in a way household consumption does not. Local governments therefore earn fiscal returns more directly from supporting producers than from serving residents, so policy tilts toward production even when officials care about welfare.

This production-oriented posture is visible across regions and over time. Local governments discount industrial land—often below acquisition cost—to attract manufacturers, extend infrastructure to industrial parks, and channel credit to preferred projects through off-budget vehicles, while healthcare, elderly care, and affordable housing are more likely to receive residual budget allocations. The persistence of this pattern, even as Beijing has broadened cadre evaluation beyond GDP growth, suggests that political incentives alone cannot explain it.

We call this pattern *local production bias*: a systematic tendency for local governments to favor production-oriented spending over welfare provision and other resident-oriented policies. The mechanism is a *fiscal wedge* embedded in the central–local tax system. Localities retain a share of value-added tax revenue generated at the place of production, but they have no comparable destination-based claim on household consumption. A new plant therefore improves the local budget through retained tax revenue, higher land values, and greater collateral capacity for borrowing far more directly than additional household spending or welfare provision. The core distortion is not simply that local governments are short of funds; it is that the fiscal system ranks production above welfare.This wedge was created by the 1994 tax-sharing reform and later repriced by the 2009 VAT reform and the 2016 Business Tax-to-value-added tax reform. Those reforms changed which activities were most fiscally attractive, but not the underlying logic: local governments continue to favor the tax bases they retain.

We formalize this mechanism in a dynamic general equilibrium model of a locality embedded in a small open economy with tradable manufacturing and non-tradable services, endogenous wages and rents, and gradual labor mobility across jurisdictions. The local government allocates spending between production-oriented infrastructure and resident-oriented welfare subject to a budget constraint tied to retained taxes and land-sale proceeds. A collateral constraint on land-backed borrowing through local government financing vehicles creates an amplification channel:

production-oriented investment raises industrial land demand, relaxes the borrowing limit, and finances further investment. Welfare spending can still improve local fiscal capacity through migration and housing-rent capitalization, but its fiscal payoff remains weaker and more delayed. The model's central result is that origin-based tax assignment tilts local governments toward production even when officials care genuinely about resident welfare; the distortion lies in the fiscal ranking of activities, not in officials' preferences.

We discipline the model with prefectural panel data, use it for policy counterfactuals, and then turn to reduced-form evidence from industrial land transactions. Across these exercises, the same message emerges: fiscal incentives have overtaken political tournaments as the dominant driver of local production bias. To begin with, using the prefectural panel, we recover the wedges from the joint dynamics of infrastructure investment, retained local revenues, land prices, and off-budget borrowing, without imposing direct measures of promotion probability or tax incentive strength. Before 2009, the political wedge—capturing promotion-driven investment above the pure fiscal optimum—accounts for roughly 55 percent of investment variation, consistent with active GDP-based tournament evaluation. By the post-2016 period, the fiscal wedge has risen to nearly 80 percent while the political wedge has fallen to roughly 15 percent of its earlier peak. This shift is economically large and statistically sharp across specifications. A variance decomposition over 2008–2019 confirms that fiscal determinants—especially the revenue gap between expenditure mandates and locally retained revenues—account for most infrastructure investment volatility.

In addiiton, the policy counterfactuals sharpen the distinction between giving local governments more money and changing what they are rewarded for. Increasing unconditional transfers closes the revenue gap and delivers the larger immediate welfare gain (ECV +3.49%), but leaves the marginal fiscal return on production higher than on welfare, so the composition of local effort does not shift. Partially reassigning production-linked tax revenue toward a destination-based claim on household consumption delivers a smaller immediate gain (ECV +0.19%) but changes the local fiscal ranking of activities: local governments reduce production subsidy, curtail land-backed borrowing, and raise private consumption more durably—because they now earn fiscal returns from residents, not just from producers. The implication is that fiscal reform without incentive reform is palliative; durable rebalancing requires changing the tax base that local governments retain.

Finally, we turn to reduced-form micro evidence from more than 540,000 industrial land transactions between 2007 and 2019. The 2016 Business Tax-to-value-added tax reform provides a natural experiment: by replacing a fully local business-tax base with shared VAT, the reform reduced local fiscal capacity differentially across cities according to their pre-reform tax composition. Using a continuous-treatment difference-in-differences design with event-study validation, we show that cities with greater fiscal exposure subsequently compressed industrial land prices by 109–321 RMB/m^2 toward the national minimum-price floor. The most striking finding is a sign reversal at the retirement threshold: party secretaries under 58 discount land aggressively (coefficient −125.5,

$p < 0.05$) to attract manufacturers, while officials at or above 58—facing no further promotion prospects—raise prices for short-run revenue (coefficient +241.8, $p < 0.01$). This is precisely the super-additive interaction between career and fiscal incentives predicted by the model. The response is also stronger where local VAT stakes are largest and in non-core cities where inter-jurisdictional competition is fiercest, while neither capital intensity nor skill intensity generates a differential effect—indicating broad fiscal demand for manufacturing rather than selective industrial upgrading.

The aggregate implications follow directly. In the full-amplification baseline, private consumption is 36.0% of GDP, domestic absorption is 80.8%, and net exports are 19.2% of output. Under the destination-based reform, private consumption rises to 40.2%, domestic absorption to 84.2%, and net exports fall to 15.8%; by contrast, the transfer counterfactual raises private consumption only to 37.4%. These magnitudes indicate that when hundreds of prefectures face the same origin-based incentive gradient, their collective production bias distorts output composition, suppresses household demand, and contributes to external imbalance. Standard accounts centered on saving motives or financial frictions capture important proximate dynamics, but they leave the underlying fiscal-institutional driver intact. We therefore interpret China's aggregate imbalance in part as the consequence of a nationally uniform local distortion.

Related Literature This paper contributes first to the literature on China's political tournaments and the Mandarin Model (Li and Zhou, 2005; Maskin, Qian and Xu, 2000; Xu, 2011; Song and Xiong, 2024). Li and Zhou (2005) demonstrate that provincial leaders whose GDP growth performance ranks above the median are significantly more likely to receive promotion, establishing the empirical foundation for the tournament interpretation of local governments' output focus. Maskin, Qian and Xu (2000) formalize how the center exploits regional competition to discipline local agents and incentivize effort. Xu (2011) argues that this regional decentralization is a fundamental source of China's high growth, with regionally decentralized experimentation permitting cross-province learning of policies that work. Song and Xiong (2024) provide updated evidence that promotion criteria evolved substantially after the mid-2000s, with environmental compliance and debt risk increasingly entering evaluation. We extend this literature in two directions. First, we show formally that even a benevolent official facing no career concerns at all would choose a production-oriented spending allocation when the local tax architecture assigns fiscal returns to production rather than consumption. Second, using a structural wedge decomposition, we document that the empirical contribution of promotion incentives to observed infrastructure investment declines sharply from the dominant share before 2009 to a fraction of total investment variation after 2016, a shift that coincides with the major VAT reforms rather than only with changes in official evaluation criteria.

Second, we contribute to the fiscal-federalism and tax-assignment literature (Wallace E. Oates,

1999; Barry R. Weingast, 2009; Hehui Jin, Yingyi Qian and Barry R. Weingast, 2005). The classic Tiebout-Oates framework asks how to assign fiscal instruments across levels of government to match service delivery with local preferences while internalizing spillovers (Oates, 1999). Weingast (2009) and Jin, Qian and Weingast (2005) apply the market-preserving federalism framework to China, arguing that revenue retention creates credible commitments that sustain reform momentum. Our analysis accepts the basic logic of fiscal incentives but identifies a previously underemphasized distortion: the origin basis of China's VAT means that local governments earn revenue from the location of production rather than of consumption. Unlike destination-based taxes, whose incidence aligns local fiscal returns with local residents' spending, origin-based taxes create an incentive gradient that favors industrial investment over welfare provision regardless of local preferences. The main distortion is therefore not simply that local governments lack money—it is that they earn money more easily from producers than from residents. This distinction has immediate policy implications: fiscal decentralization reforms that increase total local revenue without changing the origin-based assignment of the tax base may stimulate more production-oriented spending rather than improving the composition of local public services.

Third, we contribute to the literature on land finance, local industrial policy, and local government debt (Ran Tao, Fubing Su, Mingxing Liu and Guangzhong Cao, 2010; Chang Liu and Wei Xiong, 2020; Zhuo Chen, Zhiguo He and Chun Liu, 2020; Yi Huang, Marco Pagano and Ugo Panizza, 2020). Tao et al. (2010) document that industrial land in Chinese cities is systematically priced below market value while commercial and residential land is priced above it, and attribute this pattern to local government efforts to attract industrial activity. Liu and Xiong (2020) analyze the land-collateral nexus in detail, showing that LGFV debt issuance is tightly linked to local land values and that land price shocks propagate into investment and financial risk. Chen, He and Liu (2020) estimate that local government debt crowds out private-sector investment and reduces total factor productivity, linking the financing structure to macroeconomic misallocation. Huang, Pagano and Panizza (2020) document that rapid local public investment expansion in the post-crisis period crowded out private borrowing. Our contribution relative to this literature is to endogenize the land-collateral feedback within a general equilibrium model and to derive it from the underlying tax architecture rather than treating it as a separate or exogenous institution. In our model, the same fiscal rule that makes production attractive as a tax base also makes industrial land the preferred collateral asset: a local government whose budget is tied to origin-based value added will rationally use collateralized land to scale its production support above what current revenues alone would permit.

Fourth, we speak to the broader literature on China's macroeconomic imbalance (Zheng Song, Kjetil Storesletten and Fabrizio Zilibotti, 2011; Chang-Tai Hsieh and Peter J. Klenow, 2009; Marcos D. Chamon and Eswar S. Prasad, 2010; Shang-Jin Wei and Xiaobo Zhang, 2011). Song, Storesletten and Zilibotti (2011) explain China's simultaneous high growth, high saving, and cur-

rent account surplus through financial market frictions that channel entrepreneurial saving into productive investment while excluding less-productive state enterprises. Hsieh and Klenow (2009) quantify misallocation of capital and labor across firms and trace it to distortions in factor markets. Chamon and Prasad (2010) attribute high household saving rates to precautionary motives amplified by incomplete social insurance and the front-loading of durable purchases. Wei and Zhang (2011) propose a demographic channel in which sex-ratio imbalances generate competitive saving among households with sons. Our contribution is to identify a complementary fiscal-architecture channel operating on the expenditure side of local government budgets rather than on household or firm decisions directly. Origin-based fiscal incentives suppress the provision of welfare infrastructure—healthcare, pensions, education—that would reduce precautionary household saving and support higher consumer expenditure. At the same time, they direct public investment toward tradable capacity whose output must ultimately be absorbed abroad if domestic demand remains weak. Standard accounts that focus on household saving motives or financial market frictions may correctly characterize the proximate dynamics of China's imbalance while leaving the underlying government-expenditure distortion intact, and policy prescriptions that address saving or financial development alone may therefore deliver smaller and less durable improvements than expected.

Layout The remainder of the paper proceeds as follows. Section 2 describes the institutional origins of China's fiscal imbalance. Section 3 presents a baseline model with exogenous world prices, endogenous local wages and rents, partial labor mobility, fixed residential land, and sector-specific support. Section 4 extends that framework to a dynamic spatial setting with land-backed borrowing and political amplification. Section 5 presents the quantitative analysis, including historical decomposition and policy counterfactuals. Section 6 provides reduced-form evidence on fiscal pressure and industrial land pricing, using the 2016 Business Tax-to-value-added tax reform as a natural experiment. Section 7 concludes.

2 Institutional Background

China's distinctive local government behavior is rooted in a fiscal system characterized by centralized revenue authority and decentralized expenditure responsibilities. This institutional structure, shaped by a series of major tax reforms spanning three decades, has produced a persistent and sizable vertical fiscal imbalance that crucially shapes local policy incentives (Jin, Qian and Weingast, 2005; Chong-En Bai, Chang-Tai Hsieh and Zheng Michael Song, 2016). Understanding how this architecture emerged and evolved is essential to explaining why local governments systematically prioritize industrial production over household welfare, even in the absence of explicit political directives to do so.

2.1 The 1994 Tax Sharing Reform: Structural Origins of Vertical Fiscal Imbalance

Prior to 1994, China operated under a fiscal contracting regime in which local governments remitted a negotiated quota of revenues to the center and retained the remainder. This system, while conducive to local revenue mobilization, left the central government chronically revenue-constrained. By 1993, the central government's share of total tax revenue had fallen to just 22 percent, severely limiting its capacity to finance national priorities and maintain macroeconomic stability (Shaoguang Wang and Angang Hu, 2001; Christine P.W. Wong, 2013). The fiscal contracting regime also created significant regional disparities, as wealthier provinces could negotiate more favorable terms while poorer regions struggled to meet basic expenditure needs.

The 1994 Tax Sharing Reform (分税制改革) fundamentally restructured intergovernmental fiscal relations. The reform established a unified tax system, created separate central and local tax administrations, and formally divided tax categories among central, local, and shared jurisdictions. Customs duties and consumption taxes were assigned to the central government, while business taxes on services, property-related levies, and minor local surcharges remained with local authorities. Enterprise income tax was initially divided by administrative subordination: EIT from centrally owned enterprises accrued to the center, while EIT from local SOEs, collective enterprises, and township-village enterprises remained with local governments—a substantial fiscal base during the 1990s. It was the 2002 Income Tax Sharing Reform that reclassified EIT as a shared tax, splitting revenue 50:50 (later 60:40 in favor of the center) regardless of ownership. Value-added tax, the single largest revenue source, was designated as a shared tax with 75 percent accruing to the center and 25 percent retained locally (Wong, 2013; Shuanglin Lin, 2022).

The reform successfully restored central fiscal capacity, raising the central government's revenue share to approximately 50 percent within a few years. However, the reallocation of revenues was not accompanied by a corresponding reassignment of expenditure responsibilities. Local governments remained responsible for more than 80 percent of total public expenditure, including education, healthcare, infrastructure, pensions, and social protection, while retaining access to less than half of tax revenues before intergovernmental transfers (Christine Wong, 2009; Bai, Hsieh and Song, 2016). This mismatch created a structural condition of vertical fiscal imbalance in which local governments face chronic revenue shortfalls relative to their mandated obligations. The marginal value of locally generated revenue became extremely high, fundamentally shaping the incentive structure that guides local policy decisions.

The 1994 reform also introduced a critical institutional feature that would later prove consequential for local government financing: it permitted local governments to retain the full proceeds from land transfer sales. Since urban land in China is publicly owned, local governments can lease land-use rights to developers and enterprises, generating substantial off-budget revenue. This provision created the foundation for what would become known as "land finance" (土地财政), whereby

local governments use land sales and land-backed borrowing to supplement their constrained tax base (Liu and Xiong, 2020; Dingxi Huang and Roger C.K. Chan, 2018).

2.2 The 2009 and 2016 VAT Reforms: One Continuous Repricing of Sectoral Fiscal Incentives

The next major institutional changes were the 2009 VAT reform and the nationwide 2016 transition from the Business Tax to the Value-Added Tax (营改增, commonly referred to as B2V). These reforms should be read as a two-step repricing of local fiscal incentives rather than as separate stories. They did not overturn the 1994 architecture; they changed which kinds of production were most effective at generating locally retained revenue. The 2009 reform changed the treatment of capital purchases inside the VAT base by converting China's VAT from a production-type tax to a consumption-type tax and allowing firms to credit fixed-asset purchases. Before 2009, capital expenditure was more heavily embedded in the VAT base, so attracting capital-intensive producers mechanically expanded shared VAT receipts and upstream industrial demand. After 2009, that particular advantage weakened. Local governments still benefited from production, but the fiscal premium shifted away from simple capital deepening toward broader local value added, dense production linkages, and the land appreciation generated by production clusters (Wong, 2013; Lin, 2022).

The 2016 B2V reform then repriced the sectoral margin inside that same logic. Prior to the reform, many service activities paid the Business Tax and that revenue was a core local tax base. Once services were folded into VAT, local governments no longer kept the full service-side tax base; instead they received a share of VAT under the revised 50:50 central-local split (Ministry of Finance of China, 2016). This reduced the direct fiscal payoff to service-sector expansion relative to the pre-2016 system while increasing the overall local stake in origin-based value added. Put differently, the 2009 reform weakened the incentive to favor firms merely because they were capital-intensive, whereas the 2016 reform weakened the incentive to favor locally taxed services and strengthened the relative appeal of manufacturing and other production activities. The two reforms therefore belong to one continuous institutional mechanism: first the tax base shifted away from capital purchases inside VAT, then the relative fiscal return shifted away from local services and toward manufacturing and other production activities whose value added remained locally relevant.

2.3 The Consumption Tax and Zero Local Retention: A Disincentive for Welfare and Services

In contrast to the production-linked VAT, the Consumption Tax (消费税), which is levied on automobiles, tobacco, alcohol, petroleum products, luxury goods, and other selected items, is fully assigned to the central government. Local governments receive no share of this revenue, regardless

of where the goods are sold or consumed (Wong, 2013). This tax assignment rule has profound implications for local spending priorities. Since many welfare services and consumption-boosting policies expand household demand rather than industrial supply, they do not generate additional directly retained tax revenue for local governments. Social programs such as healthcare subsidies, education improvements, pension supplements, and environmental quality investments can still raise rents and land values by attracting residents, but these fiscal effects are indirect and typically weaker than the direct VAT and land-demand effects generated by production-oriented development.

This assignment structure makes China an outlier among large economies, where local sales taxes, property taxes, or VAT destination-based rules commonly align local fiscal incentives with local consumption or land-use decisions (Oates, 1999). In the United States, state and local sales taxes create incentives for governments to attract retail activity and support household purchasing power. In Canada, provinces levy independent sales taxes or participate in harmonized arrangements that direct consumption-tax revenue to the province of sale, similarly linking subnational fiscal capacity to local consumer spending. China's origin-based system operates on precisely the opposite principle: VAT and related production taxes accrue to the place of production, while consumption taxes flow entirely to the center.

In practice, local governments can ship goods outward while still retaining VAT revenue linked to production in their jurisdiction, even when the buyers live elsewhere. By contrast, consumption-oriented policies often generate fiscal benefits for other jurisdictions or only for the central government. A local government that invests in public parks, cleaner air, or better schools may attract residents who increase local consumption, but the consumption taxes on automobiles, gasoline, and luxury items purchased by these residents accrue entirely to Beijing. Welfare-induced consumption thus leaks revenue outward, while industrial investment generates concentrated local returns (Weingast, 2009).

2.4 Land Finance and the LGFV System: Amplifying Production-Based Incentives

The vertical fiscal imbalance created by the 1994 reform, combined with the production-based orientation of the tax-sharing system, gave rise to two complementary financing mechanisms that have become central to understanding local government behavior: land finance and Local Government Financing Vehicles (LGFVs). These mechanisms do not operate independently of the tax structure; rather, they amplify and entrench the incentives embedded in the formal fiscal architecture.

Land finance emerged as local governments discovered that infrastructure investment could generate fiscal returns beyond retained VAT by increasing the value of surrounding land. In China, urban land is owned by the state and administered by local governments, while rural land is collectively owned. Local governments generate substantial revenue by converting agricultural land to urban use and selling long-term land-use rights to developers and industrial enterprises (Liu and

Xiong, 2020; Meina Cai, Jianyong Fan, Chunhui Ye and Qi Zhang, 2020). At the peak of the land finance system in the mid-2010s, revenue from land-use rights transfers constituted 60 to 80 percent of local government revenue in many jurisdictions, far exceeding formal tax receipts (Huang and Chan, 2018). This created a powerful feedback loop: infrastructure investment raises industrial demand for land, which increases land prices, which generates revenue for further infrastructure investment.

However, land finance requires upfront capital to develop infrastructure before land values appreciate. Local governments in China cannot issue municipal bonds directly, a restriction that was only partially relaxed in 2014, and are prohibited from borrowing from banks in their own capacity (Yuen Yuen Ang, 2016; Xiaohuan Lan, 2024). To circumvent these constraints, local governments established Local Government Financing Vehicles, which are state-owned enterprises that borrow money on behalf of the government to finance infrastructure projects. LGFVs raise funds by issuing corporate bonds, securing bank loans, and more recently by selling wealth management products to retail investors. The borrowed funds are used for comprehensive urban development, including roads, utilities, industrial parks, and public facilities. When the developments increase surrounding land values, the local government can lease land at higher prices and use the proceeds to repay LGFV debts (Jin Hui and Isabel Rial, 2016; Chen, He and Liu, 2020).

The LGFV system expanded dramatically following the 2008 global financial crisis, when the central government announced a 4 trillion yuan stimulus package and encouraged local governments to contribute matching funds. Since approximately 70 percent of the stimulus consisted of infrastructure projects but the central government financed only 30 percent of the total, local governments turned to LGFVs to raise the necessary capital (Adam Y. Liu, Jean C. Oi and Yi Zhang, 2022). LGFV debt grew from modest levels in the mid-2000s to an estimated 66 trillion yuan, approximately 9 trillion US dollars, by 2023, representing nearly half of China's annual economic output. The International Monetary Fund has expressed concern that this debt trajectory is unsustainable and poses systemic risks to the Chinese financial system.

The critical feature of the LGFV system for understanding local government incentives is that it transforms the fiscal return on infrastructure from a flow benefit, retained VAT from induced industrial activity, into a stock-based collateral mechanism. Industrial investment raises land demand and land values, which in turn provide collateral for LGFV debt. By anchoring land prices, heavy-asset industries allow local governments to leverage future fiscal flows into larger-scale infrastructure spending, reinforcing the bias toward capital-intensive production. A local government that invests in schools or hospitals cannot use improved educational outcomes or health metrics as collateral; only the appreciation of surrounding land values translates into expanded borrowing capacity.

2.5 The Mechanism of VAT Competition: Tax Rebates and Firm Selection

The origin-based VAT system, combined with the fiscal pressures arising from vertical imbalance, creates strong incentives for local governments to actively shape the composition of their industrial base. This generates behavior that often diverges from central policy objectives and produces economically inefficient outcomes at the national level. To attract mobile manufacturing capacity, local governments commonly offer fiscal rebates by returning a portion of their retained VAT share to firms. For example, a municipality might refund 30 to 50 percent of the 50 percent VAT revenue it receives from a firm's production, effectively reducing the firm's tax burden while accepting lower net fiscal returns in exchange for maintaining or expanding the local production base. This practice induces a zero-sum form of interregional competition in which jurisdictions bid down their effective tax revenue to secure industrial activity that might otherwise locate elsewhere (Shaoda Wang, 2021).

These incentives also influence firm selection in ways that sometimes conflict with central government priorities. While the central government tends to emphasize the stability of State-Owned Enterprises and the development of strategic industries, local governments frequently favor private enterprises, particularly in sectors such as electric vehicles, batteries, solar panels, and consumer electronics, that can generate rapid locally retained value added, dense supplier demand, and visible industrial scale. Direct VAT mechanics depend on value added rather than gross turnover, so high transaction volumes matter fiscally only insofar as they proxy for or help create a larger local value-added base and the associated agglomeration and land-demand effects. A private enterprise generating 10 billion yuan in annual sales is therefore not fiscally attractive merely because gross sales are high; it becomes fiscally attractive when those sales are associated with higher local value added, faster expansion of the local tax base, and stronger downstream spillovers than a state-owned enterprise with the same employment but weaker local production linkages.

The preference for industrial activity over services reflects not only VAT considerations but also the role of heavy assets in sustaining local borrowing capacity. Industrial investment raises land demand and land values, which in turn provide collateral for LGFV debt. Service sector enterprises, by contrast, typically require less land and generate smaller spillovers to property values. A municipality choosing between attracting a manufacturing plant and a financial services office of comparable employment will strongly prefer the manufacturer because of the compound fiscal returns: a larger locally retained VAT base when local value added expands, increased land values, expanded borrowing capacity, and the potential for supply chain clustering that attracts additional industrial activity.

Taken together, these institutional features create a coherent incentive structure that favors production-led development. Infrastructure investment expands the taxable industrial base, raises land values that can serve as collateral, and generates fiscal flows that relax budget constraints.

Welfare investment, by contrast, does not relax the local fiscal constraint and may even tighten it by attracting residents who consume public services without expanding the production-based tax base. In the model that follows, these rules are incorporated directly into the local government's optimization problem to explain why, even in the absence of political career concerns, infrastructure is prioritized over social services in a fully rational and benevolent equilibrium.

3 A Baseline Model of Local Production Bias

This section rewrites the baseline model from scratch around the closure issues raised by Roger. China is treated as a small open economy. The tradable-good price is normalized to one, the interest rate is pinned down by the world capital market, and each locality is small relative to both objects. What must then be determined locally are the wage, the housing rent, and the local labor force. The local government chooses resident-oriented welfare spending S_{it} and sector-specific production support G_{ijt}. Labor is not fixed: workers respond to wages, public services, and housing costs, while residential land is fixed and clears through rents. This gives a closed baseline before adding debt or political career concerns.

The section proceeds in three steps. First, we write a benchmark locality with exogenous world prices, endogenous wages, an explicit residential land market, and finite labor mobility. Second, we characterize the local government's problem and the implied fiscal ranking between sectoral production support and welfare spending. Third, we show that the same closed baseline already delivers local production bias, weaker welfare provision, and an aggregate implication once many localities face the same tax architecture.

3.1 Closed Baseline Environment

Consider locality i in period t. The locality takes the world tradable price, normalized to one, and the world interest rate r^* as given.

3.1.1 Firms, World Prices, and Sector-Specific Support

The locality contains tradable sectors $j = 1, \ldots, J$. Output in sector j is

$$Y_{ijt} = A_{ijt} G_{ijt}^{\gamma_j} K_{ijt}^{\alpha_j} N_{ijt}^{1-\alpha_j}, \tag{1}$$

where G_{ijt} is local public support directed at sector j, K_{ijt} is private capital, and N_{ijt} is labor employed in that sector. The locality-wide aggregates are $Y_{it} \equiv \sum_j Y_{ijt}$ and $N_{it} \equiv \sum_j N_{ijt}$. Each sector is a price taker in tradable markets and rents capital at the exogenous world user cost $r^* + \delta_k$:

$$\Pi_{ijt} = Y_{ijt} - w_{it} N_{ijt} - (r^* + \delta_k) K_{ijt}. \tag{2}$$

Profit maximization implies

$$r^* + \delta_k = \alpha_j \frac{Y_{ijt}}{K_{ijt}}, \tag{3}$$

$$w_{it} = (1 - \alpha_j) \frac{Y_{ijt}}{N_{ijt}}. \tag{4}$$

Equations (3) and (4) give the first closure point. Better local support G_{ijt} raises the demand for labor and attracts capital at the world rate, but expansion is not free because all sectors in locality i must hire workers at the common local wage w_{it}.

3.1.2 Households, Housing, and Partial Mobility

A representative resident in locality i consumes private tradables c_{it}, receives local welfare services S_{it}, and consumes housing services h_{it}. Period utility is

$$u_{it} = \left[\phi c_{it}^{\rho} + (1 - \phi) S_{it}^{\rho}\right]^{1/\rho} + \psi \ln h_{it}, \qquad \rho < 0, \tag{5}$$

so private consumption and welfare services remain complements, while housing is a separate congestible good. The resident's budget constraint is

$$c_{it} + q_{it} h_{it} = w_{it} + a_t, \tag{6}$$

where q_{it} is the local housing rent and a_t denotes asset income and transfers common across locations. Aggregate local household demand is $C_{it} \equiv N_{it} c_{it}$.

Residential land is fixed locally:

$$N_{it} h_{it} = \bar{H}_i, \tag{7}$$

where $\bar{H}_i$ is the exogenous stock of residential land. Let $V_{it} = V(w_{it}, q_{it}, S_{it})$ denote the indirect utility associated with (5)–(6). Labor is partially mobile across localities and satisfies

$$N_{it} = \mathcal{N}_i(V_{it} - \bar{V}_t), \qquad \mathcal{N}_i' > 0, \tag{8}$$

where $\bar{V}_t$ is the national outside option. This nests the usual perfect-mobility condition as a limiting case of very large migration elasticity, while remaining more realistic for China in the presence of migration frictions. Equations (7) and (8) jointly imply an upward-sloping labor supply schedule to each locality: attracting more workers raises housing demand, tighter housing raises rents, and higher rents require a higher nominal wage or better services to induce further inflows.

3.1.3 Local Government and Fiscal Revenue

The local government chooses welfare spending S_{it} and sectoral public investment I_{ijt}. Public support evolves according to

$$G_{ij,t+1} = (1 - \delta_g)G_{ijt} + I_{ijt}. \tag{9}$$

In the benchmark no-debt problem, the flow budget constraint is

$$S_{it} + \sum_{j=1}^{J} I_{ijt} = E_{it} + T_{it}, \tag{10}$$

where T_{it} is an exogenous transfer from the center and own-source revenue is

$$E_{it} = \eta_v \tau_v \sum_{j=1}^{J} Y_{ijt} + \eta_c \tau_c C_{it} + \tau_h q_{it} \bar{H}_i. \tag{11}$$

The first term is retained origin-based production taxation, the second is the locality's consumption-side fiscal claim, and the third captures land leasing, land-use fees, and related housing-based revenue. Equation (11) is the key correction to the older formulation. Welfare spending is not treated as fiscally sterile. Better public services can attract residents, support local consumption, and bid up housing rents. But those fiscal effects are weaker, more indirect, and more delayed than the production-side return generated when the locality expands sectors whose value added it partially retains.

3.2 The Local Government's Problem

The benchmark local government is benevolent toward local residents and maximizes resident welfare:

$$\max_{\{S_{it}, I_{ijt}\}} \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left\{ \left[\phi c_{it}^{\rho} + (1-\phi) S_{it}^{\rho}\right]^{1/\rho} + \psi \ln h_{it} \right\} \tag{12}$$

subject to (9) and (10), taking into account that Y_{it}, C_{it}, q_{it}, w_{it}, and N_{it} are equilibrium objects determined by firms, households, migration, and the housing market. The objective coincides with resident period utility (5). Because housing supply is fixed at $\bar{H}_i$ and per-capita housing satisfies $h_{it} = \bar{H}_i / N_{it}$, the housing term enters the government's first-order conditions only through the equilibrium population response; it does not affect the intratemporal trade-off between S_{it} and I_{ijt} conditional on N_{it}.

For each sector j, define the sector-specific marginal fiscal return to production support as

$$\Omega_{ijt} \equiv \eta_v \tau_v \frac{\partial Y_{it}}{\partial G_{ijt}} + \eta_c \tau_c \frac{\partial C_{it}}{\partial G_{ijt}} + \tau_h \bar{H}_i \frac{\partial q_{it}}{\partial G_{ijt}}, \tag{13}$$

$$\mathrm{MFRI}_{it} \equiv \max_j \Omega_{ijt}$$

and define the marginal fiscal return to welfare as

$$\mathrm{MFRW}_{it} = \eta_c \tau_c \frac{\partial C_{it}}{\partial S_{it}} + \tau_h \bar{H}_i \frac{\partial q_{it}}{\partial S_{it}}. \tag{14}$$

In this notation, MFRI_{it} is the fiscal return on the marginal unit allocated to the highest-yield production activity, while MFRW_{it} is the fiscal return on resident-oriented welfare. The one-sector case is nested when $J = 1$. Let R^P_{ijt} denote the utility-equivalent planner-side social return to support in sector j: the increment to resident welfare generated by higher future wages, private consumption, migration, and housing services after a marginal increase in G_{ijt}, expressed in units of local fiscal resources. The planner values R^P_{ijt}, whereas the decentralized government values both R^P_{ijt} and the additional locally retained fiscal payoff Ω_{ijt}.

Let μ_{it} denote the multiplier on the local fiscal constraint. The first-order condition for welfare spending is

$$U_{S,it} = \mu_{it}\big(1 - \mathrm{MFRW}_{it}\big), \tag{15}$$

where $U_{S,it}$ is the total marginal utility value of higher welfare spending, including the direct service benefit and the induced equilibrium effects transmitted through wages, private consumption, migration, and housing services. For any sector j receiving interior public support, the Euler condition is

$$\mu_{it} = \beta\, \mathbb{E}_t\Big[\mu_{i,t+1}\big(1 - \delta_g + R^P_{ij,t+1} + \Omega_{ij,t+1}\big)\Big]. \tag{16}$$

Because the government allocates support toward the highest-yield activity, the relevant production margin is the sum of the planner-side social return and the local fiscal return. Let R^P_{it} denote the social return associated with the activity chosen at the margin. Combining the two conditions yields

$$\frac{U_{S,it}}{1 - \mathrm{MFRW}_{it}} = \beta\, \mathbb{E}_t\left[\frac{U_{S,i,t+1}}{1 - \mathrm{MFRW}_{i,t+1}}\big(1 - \delta_g + R^P_{i,t+1} + \mathrm{MFRI}_{i,t+1}\big)\right].$$

Relative to a planner that allocates resources according to social returns alone, the decentralized government attaches an extra continuation payoff to production support whenever it expands the local tax base or land-rent base more strongly than welfare does. The distortion therefore comes from the additional fiscal return MFRI_{it} and the weaker welfare-side fiscal offset MFRW_{it}, not from ignoring the direct welfare consequences of higher wages and consumption.

Lemma 1 (Wage-Rent Closure with Partial Mobility)**.** *Suppose* $\partial Y_{it}/\partial G_{ijt} > 0$ *for an actively*

supported sector j, residential land is fixed, and local labor supply is upward sloping through (8). Then an increase in G_{ijt} that attracts firms also raises local employment, housing rents, and the local wage:

$$\frac{dN_{it}}{dG_{ijt}} > 0, \qquad \frac{dq_{it}}{dG_{ijt}} > 0, \qquad \frac{dw_{it}}{dG_{ijt}} > 0.$$

Proof. Higher G_{ijt} raises the marginal product of capital and labor in sector j, so firms demand more inputs at the fixed world capital cost. Because labor is not fixed locally, the higher labor demand induces migration through (8). With residential land fixed by (7), the larger local population bids up q_{it}. The marginal worker must then be compensated for the higher housing cost, so the equilibrium nominal wage rises as well. ■ □

Lemma 1 plays two roles in the argument. First, it validates the spatial equilibrium: production support generates sustained fiscal flows without implying unlimited firm entry, because higher wages and rents act as endogenous limits on expansion. This is consistent with the micro evidence in Tao et al. (2010), who document that industrial park development raises surrounding land prices even when industrial land itself is sold at deep discounts—the land-price appreciation is the mechanism that limits oversupply and also generates the fiscal return local governments anticipate. Second, the lemma establishes that both production support and welfare affect the local fiscal base through the same housing-market channel. The essential difference between the two instruments must therefore arise elsewhere, namely from the locally retained value-added tax on production that has no welfare-spending counterpart. Lemma 2 makes that gap precise.

Lemma 2 (Fiscal Wedge with Wage and Land-Market Closure)**.** *Suppose: (i) at least one actively supported sector raises tradable output directly, so $\partial Y_{it}/\partial G_{ijt} > 0$; (ii) both production support and welfare raise housing rents through migration and capitalization, so $\partial q_{it}/\partial G_{ijt} > 0$ and $\partial q_{it}/\partial S_{it} > 0$; and (iii) welfare spending does not directly enter the tradable production function ($\partial Y_{it}/\partial S_{it} = 0$) and the local consumption-tax retention rate η_c is sufficiently small that*

$$\eta_v \tau_v \frac{\partial Y_{it}}{\partial G_{ij^*t}} > \eta_c \tau_c \left(\frac{\partial C_{it}}{\partial S_{it}} - \frac{\partial C_{it}}{\partial G_{ij^*t}} \right)^+ + \tau_h \bar{H}_i \left(\frac{\partial q_{it}}{\partial S_{it}} - \frac{\partial q_{it}}{\partial G_{ij^*t}} \right)^+, \tag{17}$$

where j^* is the highest-yield sector and $(x)^+ \equiv \max(x, 0)$. Then under origin-based taxation with $\eta_v > 0$,

$$MFRI_{it} > MFRW_{it} > 0.$$

Proof. Equation (14) implies that welfare generates a positive fiscal return whenever it raises local consumption or housing rents, so $\text{MFRW}_{it} > 0$. Write the difference between the two marginal

fiscal returns:

$$\text{MFRI}_{it} - \text{MFRW}_{it} = \underbrace{\eta_v \tau_v \frac{\partial Y_{it}}{\partial G_{ij^*t}}}_{>0 \text{ by (i)}} + \eta_c \tau_c \left(\frac{\partial C_{it}}{\partial G_{ij^*t}} - \frac{\partial C_{it}}{\partial S_{it}} \right) + \tau_h \bar{H}_i \left(\frac{\partial q_{it}}{\partial G_{ij^*t}} - \frac{\partial q_{it}}{\partial S_{it}} \right).$$

The first term is the direct production-tax advantage of production support, which is strictly positive because welfare does not enter tradable production. The second and third terms capture differential consumption-tax and rent-capitalization responses; these may be negative if welfare raises consumption or rents more effectively than production support. Condition (17) ensures that the production-tax advantage dominates any such differential, so $\text{MFRI}_{it} - \text{MFRW}_{it} > 0$. Note that (17) is satisfied automatically when $\eta_c = 0$ (the pre-2009 regime) or when production support raises rents and consumption at least as strongly as welfare does; it fails only if η_c is large enough that the consumption-tax advantage of welfare fully offsets the production-tax channel—precisely the reversal that Counterfactual B's destination-based reform is designed to achieve. ■ □

Lemma 2 is the paper's central theoretical result, and it departs from the standard fiscal-federalism framework in an important direction. The classic Oates (1999) assignment principle recommends decentralizing taxes whose base is immobile and internalizing spillovers at the appropriate level. Jin, Qian and Weingast (2005) apply this to China and argue that local revenue retention gives officials "a bigger stake in local economic development." Lemma 2 shows that this stake is asymmetric: under an origin-based system, the fiscal return on production support is categorically higher than the return on welfare, because welfare provision lacks a direct VAT counterpart. Welfare is not fiscally worthless—it attracts residents and capitalizes into housing rents—but those indirect effects are weaker and more delayed than the direct production-tax return. The lemma condition (17) makes this precise: the asymmetry holds whenever the locally retained consumption-tax share is small enough that it cannot fully offset the origin-based production-tax advantage, which is the empirically relevant case throughout our sample period. The baseline distortion is therefore a ranking problem, not a zero-versus-positive problem. This distinction matters for policy: transfers that raise total local revenue without changing the production-versus-consumption fiscal ranking will not correct the composition bias, whereas a destination-based reform directly attacks the asymmetric gradient.

3.3 Distorted Expenditure Composition

The fiscal ranking in Lemma 2 is sufficient to distort expenditure composition even when the government is fully benevolent. The intuition is that the government faces a lower effective shadow cost of funds for production-oriented spending than for welfare: each unit allocated to an actively supported sector returns a fraction through expanded VAT and land revenue, reducing the net

cost to the budget, while for welfare only the weaker consumption-tax and rent-capitalization offsets apply. The government therefore allocates resources toward production up to the point at which its effective shadow cost equals that of welfare, which occurs at a production-to-welfare ratio above the social optimum. This is the mechanism behind the pattern documented by Tao et al. (2010): industrial land is priced below acquisition cost in most Chinese cities while commercial and residential land is priced above market, reflecting the differential net fiscal burden local governments attach to industrial versus resident-oriented allocation.

Proposition 1 (Production Bias)**.** *Let* $(\{I_{ij}^{\dagger}\}_{j=1}^{J}, S^{\dagger})$ *denote the allocation chosen by the benchmark local government and* $(\{I_{ij}^{*}\}_{j=1}^{J}, S^{*})$ *the allocation chosen by a planner facing the same technologies and local price system but without origin-based fiscal retention. If the fiscal constraint binds and* $MFRI_{it} > MFRW_{it}$*, then the local government tilts expenditure toward production support:*

$$\frac{\sum_j I_{ij}^{\dagger}}{S^{\dagger}} > \frac{\sum_j I_{ij}^{*}}{S^{*}}. \tag{18}$$

Moreover, if sector a yields a higher fiscal return than sector b, so $\Omega_{iat} > \Omega_{ibt}$*, then*

$$\frac{I_{ia}^{\dagger}}{I_{ib}^{\dagger}} > \frac{I_{ia}^{*}}{I_{ib}^{*}}. \tag{19}$$

Proof. Equation (15) shows that one unit of welfare has effective fiscal cost $1 - \mathrm{MFRW}_{it}$ around the total marginal utility value $U_{S,it}$. Equation (16) shows that one unit of support to sector j has continuation value $1 - \delta_g + R_{ij,t+1}^{P} + \Omega_{ij,t+1}$. The planner also values the social component $R_{ij,t+1}^{P}$, but does not value the locally retained fiscal payoff $\Omega_{ij,t+1}$. When $\mathrm{MFRI}_{it} > \mathrm{MFRW}_{it}$, reallocating one fiscal unit from welfare toward the highest-yield production activity adds a larger fiscal continuation payoff in the decentralized problem than in the planner's problem, so the decentralized allocation places relatively more weight on production support. The same logic implies that sectors with higher Ω_{ijt} receive a larger share of the support budget than they would under the planner. ■ □

Proposition 1 characterizes both the aggregate composition of public expenditure and the sectoral allocation within production-oriented spending. The second part—that sectors with higher fiscal yield receive disproportionate support—provides a foundation for the factor misallocation documented by Hsieh and Klenow (2009): public investment directed toward high-fiscal-yield manufacturing draws in capital and labor at rates exceeding their marginal social product, contributing to the dispersion of marginal products across firms that Hsieh and Klenow measure across Chinese industries. The next proposition traces the demand-side consequence: the same fiscal asymmetry that tilts public spending toward production also suppresses household consumption through the underprovision of welfare.

Proposition 2 (Welfare Suppression)**.** *Under the benchmark fiscal system, welfare spending remains below the first-best level even though it carries a positive indirect fiscal return. Moreover, when $\rho < 0$, the resulting underprovision of welfare suppresses household demand.*

Proof. Lemma 2 implies that welfare has a positive fiscal feedback, but that feedback is weaker than the fiscal return on the best production-oriented use of local funds. With a binding fiscal constraint, the government therefore substitutes away from S_{it} toward sectoral support, so $S^{\dagger} < S^{*}$. Under (5), the cross-partial U_{cS} is positive whenever $\rho < 0$. Lower welfare provision therefore reduces desired private consumption per resident; with migration and housing congestion, it also depresses aggregate household demand relative to the planner's allocation. ■ □

Proposition 2 identifies the micro-level origin of the aggregate demand shortfall that appears in the macroeconomic imbalance literature. Chamon and Prasad (2010) show that Chinese households save at unusually high rates and attribute this to precautionary motives amplified by incomplete social insurance. Proposition 2 provides a complementary fiscal-expenditure mechanism: local governments systematically underprovide exactly the welfare infrastructure—healthcare, pensions, education—whose absence amplifies precautionary saving. The two accounts are reinforcing rather than competing: Chamon and Prasad's household-level mechanism operates on the demand side, while the present result operates through the public expenditure allocation. Crucially, the welfare suppression holds even when the government is fully benevolent and values resident welfare directly. The distortion arises from fiscal architecture, not from agency problems or shortsighted officials, which means that reforms addressing political myopia without changing local tax assignment will leave the welfare suppression margin intact.

Proposition 3 (Aggregate Implication)**.** *If many localities face the same origin-based wedge and direct support toward high-yield tradable sectors, then the local distortion toward production support can aggregate into excess tradable capacity at the national level. Along the transition path, aggregate output can exceed domestic absorption, with the difference appearing as net exports and rising net foreign assets.*

Proof. By Proposition 1, each locality overallocates fiscal resources toward production-oriented support relative to welfare, and the distortion is concentrated in sectors with high local fiscal yield. By Proposition 2, each locality simultaneously depresses household demand. Aggregating across localities therefore raises tradable capacity faster than domestic absorption. In a small open economy, the excess is absorbed by the external sector, so $NX_t = Y_t - D_t > 0$ along the transition until the economy accumulates the corresponding net foreign asset position. ■ □

Proposition 3 connects the local mechanism to both accounts of China's macroeconomic imbalance. Against the Song, Storesletten and Zilibotti (2011) account—which attributes China's simultaneous high growth and current account surplus to financial frictions directing entrepreneurial

saving toward productive private firms—Proposition 3 identifies a distinct public-expenditure channel that operates through local government investment choices rather than private saving. The two mechanisms are additive: financial frictions shape the private-sector margin while fiscal incentives shape the public-sector margin, and both push tradable capacity expansion ahead of domestic absorption. Against the misallocation account of Hsieh and Klenow (2009), Proposition 1 identifies local government production bias as one organized source of the cross-industry factor allocation distortions they measure. The baseline model therefore delivers local production bias, welfare suppression, and an aggregate imbalance implication in a closed and internally consistent framework. That is the baseline we carry into the quantitative model, which adds land-backed borrowing and political career incentives as amplifiers.

4 A Dynamic Spatial Model with Debt, Politics, and Aggregate Implications

With the baseline mechanism established, the next question is how it behaves once localities are linked through migration, land markets, and intertemporal finance. Rather than restating the closed-economy argument from scratch, this section places the same locality problem inside a dynamic spatial system and adds the two amplifiers that matter most in the Chinese data: land-backed borrowing and political career incentives. Sector-specific support therefore enters here as a continuation of the baseline logic rather than as a new ad hoc ingredient.

The discussion proceeds in three steps. Section 4.1 sets out the quantitative spatial environment. Section 4.2 then shows how factor reallocation, land finance, and political incentives magnify the baseline fiscal ranking. The later subsections bring those mechanisms to the data through calibration and quantitative analysis.

4.1 Model Setup

The economy consists of a continuum of localities indexed by $i \in [0,1]$. Each locality contains households, tradable sectors, residential land, and a local government. The baseline objects remain in place: local wages and housing rents are endogenous, labor reallocates across locations with finite elasticity, and governments allocate spending between welfare and sector-specific production support.

4.1.1 Households, Housing, and Spatial Equilibrium

Let $V_{it} = V(w_{it}, q_{it}, S_{it})$ denote the indirect utility associated with the household problem in Section 3. In the spatial model,

$$N_{it} = \mathcal{N}_i(V_{it} - \bar{V}_t)\,, \tag{20}$$

$$N_{it} h_{it}(w_{it}, q_{it}, S_{it}) = \bar{H}_i. \tag{21}$$

Equation (20) is the migration condition with finite elasticity, while (21) is the residential land market-clearing condition. Together they imply a local labor supply schedule

$$w_{it} = \mathcal{W}(N_{it}, S_{it}, \bar{H}_i, \bar{V}_t), \qquad \frac{\partial \mathcal{W}}{\partial N_{it}} > 0. \tag{22}$$

Even with hukou frictions and imperfect mobility, the long-run direction is clear: localities that want more workers must compensate them through wages, public services, or both, and the compensation required rises when housing supply is tight.

4.1.2 Firms and the World Capital Market

Tradable firms continue to operate under (1). Because capital is rented at the exogenous world rate, the capital stock in each supported sector adjusts until

$$r^* + \delta_k = \alpha_j \frac{Y_{ijt}}{K_{ijt}}. \tag{23}$$

Combining (23) with the local labor supply schedule (22) makes the closure explicit at the quantitative stage. Better local support raises labor demand and draws in capital, but it also raises equilibrium wages by increasing demand for workers in a city with fixed residential land.

4.1.3 Government Budget, Debt, and Sectoral Support

The local government in each locality chooses welfare spending S_{it}, sector-specific investment I_{ijt}, and debt issuance $D_{i,t+1}$ to maximize

$$\max_{\{S_{it}, I_{ijt}, D_{i,t+1}\}} \mathbb{E}_t \sum_{s=0}^{\infty} \beta^s \left[\omega U_{i,t+s} + (1-\omega)\kappa_t \hat{\theta}_{i,t+s} - \Psi\left(\frac{D_{i,t+s}}{Y_{i,t+s}}\right) \right], \tag{24}$$

where $U_{i,t+s}$ is aggregate resident welfare as in (12) and $\omega \in (0, 1]$ is the weight on benevolent objectives. The political performance measure $\hat{\theta}_{i,t+s} \equiv \ln Y_{i,t+s} - \ln Y_{i,t+s-1}$ captures output growth visible to superiors, and $\kappa_t \geq 0$ scales the intensity of career incentives in the cadre evaluation system, so that the second term rewards policies that raise measured local output. The leverage

penalty $\Psi(\cdot)$ is an increasing, convex function of the debt-to-output ratio that captures the cost of fiscal distress; it nests a hard budget constraint when Ψ is sufficiently steep and a soft constraint when Ψ is flat.

The flow budget constraint is

$$S_{it} + \sum_{j=1}^{J} I_{ijt} + (1 + r_{it}^{g}) D_{it} = \eta_v \tau_v \sum_{j=1}^{J} Y_{ijt} + \eta_c \tau_c C_{it} + \tau_h q_{it} \bar{H}_i + T_{it} + D_{i,t+1}, \tag{25}$$

and borrowing is limited by housing-collateral values:

$$D_{i,t+1} \leq \Xi q_{it} \bar{H}_i. \tag{26}$$

Equations (25) and (26) keep land finance explicit. Higher rents enlarge contemporaneous fiscal revenue and expand the collateral base against which local governments can borrow.

Sector-specific support remains central in the quantitative model. Local governments do not choose a single undifferentiated G_{it} and only later discover industry bias. They choose support at the sectoral margin from the outset, and the fiscal ranking across sectors is one of the objects we want the quantitative model to discipline.

4.2 General Equilibrium Amplification

The baseline model shows that origin-based local fiscal accounting distorts expenditure composition even under benevolent governance. The dynamic spatial model adds three amplification mechanisms. First, factor reallocation raises the return to production support because capital and labor flow toward productive localities and sectors. Second, fixed residential land converts those inflows into higher housing rents and therefore more land-based revenue and collateral. Third, debt and political incentives encourage governments to front-load the projects with the strongest local fiscal yield.

4.2.1 The Baseline Distortion in Spatial Equilibrium

In the spatial model, the local government's Euler equation becomes

$$\frac{U_{S,it}}{1 - \mathrm{MFRW}_{it}^{GE}} = \beta \, \mathbb{E}_t \left[\frac{U_{S,i,t+1}}{1 - \mathrm{MFRW}_{i,t+1}^{GE}} \left(1 - \delta_g + R_{i,t+1}^{P,GE} + \mathrm{MFRI}_{i,t+1}^{GE}\right) \right],$$

where

$$\Omega_{ijt}^{GE} = \eta_v \tau_v \frac{dY_{it}}{dG_{ijt}} + \eta_c \tau_c \frac{dC_{it}}{dG_{ijt}} + \tau_h \bar{H}_i \frac{dq_{it}}{dG_{ijt}}, \tag{27}$$

$$\text{MFRI}_{it}^{GE} \equiv \max_j \Omega_{ijt}^{GE}, \tag{28}$$

$$\text{MFRW}_{it}^{GE} = \eta_c \tau_c \frac{dC_{it}}{dS_{it}} + \tau_h \bar{H}_i \frac{dq_{it}}{dS_{it}}. \tag{29}$$

Here $R_{it}^{P,GE}$ is the planner-side social return to the activity chosen at the margin once capital inflows, labor inflows, wages, and housing congestion are allowed to adjust. The general-equilibrium objects now incorporate those price and population responses, so both the social return and the fiscal ranking are evaluated after local equilibrium has adjusted.

Proposition 4 (General Equilibrium Fiscal Wedge)**.** *In the spatial small-open-economy equilibrium with origin-based taxation, fixed residential land, finite labor mobility, and sector-specific support, the symmetric steady state satisfies:*

(i) $\sum_j I_{ij}^{\dagger}/S^{\dagger} > \sum_j I_{ij}^{*}/S^{*}$.

(ii) $S^{\dagger} < S^{*}$.

(iii) support is concentrated in sectors with larger values of Ω_{ijt}^{GE}.

(iv) the distortion is increasing in η_v, τ_v, τ_h, *and the relevant sectoral support elasticities* γ_j, *and decreasing in* η_c.

Proof. The spatial equilibrium changes the derivatives in the revenue function but not the logic of the fiscal wedge. As long as $\text{MFRI}_{it}^{GE} > \text{MFRW}_{it}^{GE}$, the effective shadow cost of welfare exceeds the effective shadow cost of production support in the local government's problem. A rise in η_v, τ_v, τ_h, or a sectoral support elasticity γ_j increases the local revenue consequences of tradable production and land capitalization, while a rise in η_c increases the direct local fiscal return to resident demand and welfare. The expenditure ratio therefore tilts further toward production support when the first set of parameters rises and toward welfare when η_c rises. Because the government chooses the highest-yield margin, sectors with larger Ω_{ijt}^{GE} receive more support than under the planner. ■ □

Proposition 4 carries the baseline fiscal wedge into the spatial setting and provides the comparative statics that the historical decomposition exploits. Part (iv) is especially relevant: the distortion is increasing in the retained production-tax share and decreasing in the retained consumption-tax share. This is exactly the cross-regime variation that the wedge decomposition uses to identify the fiscal channel—the 2009 VAT reform shifted the composition of the local production-tax base, and the 2016 B2V reform changed the relative weight of services versus manufacturing within it. Proposition 4 also clarifies the policy logic in Weingast (2009): fiscal incentives for local development

may raise growth, but their composition consequences depend critically on whether the retained tax base is origin-based or destination-based. Origin-based retention induces production bias; a destination-based rule of equal magnitude would generate a consumption orientation instead. The form of the fiscal incentive, not only its intensity, determines the type of bias.

4.2.2 Factor Reallocation, Wages, and Housing Rents

The key closure concern remains whether firm entry is self-limiting once support is sector-specific. In the rewritten model, the answer is yes.

Proposition 5 (Factor Reallocation and Wage-Rent Closure)**.** *Holding aggregate objects fixed, an increase in support to an active local sector j implies*

$$\frac{dK_{ijt}}{dG_{ijt}} > 0, \qquad \frac{dN_{it}}{dG_{ijt}} > 0, \qquad \frac{dq_{it}}{dG_{ijt}} > 0, \qquad \frac{dw_{it}}{dG_{ijt}} > 0. \tag{30}$$

Sector-specific support therefore attracts firms and workers, but the resulting increase in housing rents makes local labor supply upward sloping and closes the expansion problem.

Proof. Equation (23) implies that higher G_{ijt} raises the marginal product of capital in sector j and therefore attracts capital at the world rate, so $dK_{ijt}/dG_{ijt} > 0$. Higher capital and sectoral support raise local labor demand, which attracts workers through (20). Because residential land is fixed, the inflow of workers raises q_{it} through (21). The migration condition then requires a compensating increase in the nominal wage, so $dw_{it}/dG_{ijt} > 0$. ■ □

This proposition is the formal answer to the wage objection: a locality can attract firms by improving infrastructure or targeted support, but expansion also raises equilibrium wages through housing congestion. The upward-sloping local labor supply also implies that the rent-capitalization component of the fiscal return is larger in cities where residential land is scarcer: a given inflow of workers bids up rents more sharply when housing supply is tight, so the collateral and revenue benefit of attracting firms is concentrated in land-constrained cities. Bai, Hsieh and Song (2016) document that local government production-oriented distortions are larger and more persistent in coastal cities with tighter housing markets. The land-supply constraint that closes the expansion problem in Proposition 5 simultaneously amplifies the production bias wherever land is scarce—precisely the cities where the next proposition's land-finance accelerator is quantitatively largest.

4.2.3 Land Finance and Debt Amplification

When borrowing is collateralized by land values, the fiscal asymmetry becomes stronger rather than weaker.

Proposition 6 (Land Finance Accelerator)**.** *With borrowing constraint* (26)*, the effective marginal return to production support and welfare become*

$$\widetilde{MFRI}_{it} = MFRI_{it}^{GE} + \lambda_{it}^{D}\Xi\bar{H}_i\frac{dq_{it}}{dG_{ij^*t}}, \tag{31}$$

$$\widetilde{MFRW}_{it} = MFRW_{it}^{GE} + \lambda_{it}^{D}\Xi\bar{H}_i\frac{dq_{it}}{dS_{it}}, \tag{32}$$

where $\lambda_{it}^{D} \geq 0$ *is the shadow value of collateral and* j^* *denotes the highest-yield active sector. If* $dq_{it}/dG_{ij^*t} > dq_{it}/dS_{it}$*, then debt access amplifies the production bias.*

Proof. Relaxing the borrowing constraint by one unit is worth λ_{it}^{D} to the government. Since debt capacity is proportional to $q_{it}\bar{H}_i$, any policy that raises rents also raises collateral. Production support and welfare both affect rents, but support to the highest-yield production activity typically does so more strongly because it attracts both firms and workers. The collateral channel therefore adds a larger increment to the return on production support than to the return on welfare. ■ □

The important point is comparative, not absolute. Land-backed borrowing rewards the policy that generates the strongest combination of tradable output, land demand, and collateral value. This amplification mechanism corresponds directly to the evidence in Liu and Xiong (2020), who show that LGFV debt issuance tracks local land values closely and that land price shocks propagate rapidly into local public investment by relaxing the collateral constraint. Proposition 6 provides the theoretical foundation: given origin-based fiscal incentives, land collateral is valuable precisely because it amplifies the fiscal return on production-oriented investment beyond what current revenues alone permit. The asymmetry the proposition makes explicit is welfare-relevant: welfare investment does not generate the same collateral-feedback loop because it does not raise industrial land demand as strongly as production-oriented infrastructure. A government facing a tight collateral constraint therefore has an additional reason to favor production over welfare—the leverage cycle that Chen, He and Liu (2020) associate with reduced private investment and Huang, Pagano and Panizza (2020) associate with post-crisis crowding out is endogenous to the fiscal architecture rather than a separate institutional pathology.

4.2.4 Political Incentives and Sectoral Targeting

Political incentives shift the composition of spending toward activities with high measured output, and in this model those are typically the same activities with high local fiscal yield.

Proposition 7 (Political and Debt Amplification)**.** *Compared with the benevolent benchmark, an increase in career concerns* κ_t *or in collateral capacity* Ξ *raises equilibrium production-oriented support. When both rise together, the effect is super-additive and is concentrated in sectors with high fiscal yield.*

Proof. The political component of (24) rewards output growth and therefore loads directly on policies that raise tradable production. The collateral parameter Ξ raises the amount of future spending that can be brought forward against current land values. When both forces operate simultaneously, the government prefers to front-load the projects that deliver the strongest combination of measured output, current revenue, and collateral creation. Since those projects also have high Ω_{ijt}^{GE}, the interaction is stronger than either channel in isolation. ■ □

Proposition 7 bridges the fiscal channel and the political tournament literature. Li and Zhou (2005) and Xu (2011) establish that GDP growth drives cadre evaluation and creates front-loading incentives for visible infrastructure over slower-maturing welfare investments. Proposition 7 shows that fiscal and tournament incentives are aligned in this model: the activities that generate the highest measured GDP contribution—tradable manufacturing, large-scale infrastructure, industrial clusters—also carry the highest local fiscal yield, so political and fiscal motives reinforce each other rather than pulling in different directions. This alignment helps explain the puzzle noted by Song and Xiong (2024): local public investment remained high and concentrated in production-oriented activities throughout the post-2009 period even as GDP-based promotion criteria weakened. When κ_t falls, the fiscal and collateral channels together sustain production-oriented investment as long as land values and debt capacity remain available—which is what the wedge decomposition finds in the 2009–2015 period.

4.2.5 Aggregate Implications

Putting the pieces together yields the aggregate implications used in the quantitative section.

Proposition 8 (Aggregate Implications of Local Production Bias)**.** *In the spatial small-open-economy equilibrium with origin-based taxation, finite labor mobility, fixed residential land, land-backed borrowing, and sector-specific support:*

(i) the production-support-to-welfare ratio exceeds the first-best at every level of aggregation;

(ii) local labor and capital reallocate toward high-fiscal-yield localities and sectors;

(iii) domestic absorption can grow more slowly than tradable capacity, so trade surpluses may persist along the transition path;

(iv) local leverage rises with land values and expected future production.

Proof. Part (i) follows from Propositions 4 and 6. Part (ii) follows from Proposition 5 and the sectoral allocation rule embedded in Ω_{ijt}^{GE}. Part (iii) follows because every locality expands tradable capacity faster than welfare-supported household demand, reproducing the local mechanism of Proposition 3 at the aggregate level. Part (iv) follows from the borrowing constraint (26) and Proposition 7. ■ □

4.2.6 Discussion

The dynamic spatial model adds three quantitative amplifiers to the baseline fiscal wedge: factor reallocation with spatial price adjustment, land-backed borrowing, and political career incentives. Together they account for the progression from the baseline composition result in Propositions 1 and 2 to the leverage cycle and investment boom observed in the data after 2009.

The land-finance amplifier (Proposition 6) converts the flow fiscal return on production-oriented investment into a stock-based collateral mechanism, allowing local governments to scale investment beyond current revenues. Liu and Xiong (2020) document this mechanism empirically; Chen, He and Liu (2020) and Huang, Pagano and Panizza (2020) trace its costs in crowded-out private investment and reduced productivity. The model endogenizes this feedback from the tax architecture: a government facing origin-based fiscal incentives also faces a collateral constraint that rewards the same activities the fiscal regime favors, so the two forces compound.

The political amplifier (Proposition 7) connects to the tournament literature by showing that career concerns and fiscal incentives target the same margin. Li and Zhou (2005) and Xu (2011) establish the empirical relevance of tournament incentives; Song and Xiong (2024) document their weakening after 2009. The model predicts that as κ_t declines, the fiscal and collateral channels substitute for the weakening political amplifier, sustaining production-oriented investment even as political pressures ease.

Together, the three amplifiers generate the aggregate implications of Proposition 8, which connect to three accounts of China's macroeconomic imbalance in the literature: financial-market frictions (Song, Storesletten and Zilibotti, 2011), factor market distortions (Hsieh and Klenow, 2009), and—the present paper's contribution—public investment distortions from local fiscal architecture. These are the objects the calibration and historical decomposition aim to discipline.

4.3 Calibration

This section calibrates the quantitative version of the closed baseline developed in Section 3. The theory is sector-specific, but city-year data do not observe a complete allocation of support across all G_{ijt}. In the quantitative implementation, we therefore map the full sectoral problem into a reduced-form two-block version: a high-fiscal-yield tradable block that receives the bulk of observed infrastructure and industrial support, and a resident-oriented block that captures welfare and local demand. The calibration must therefore discipline not only expenditure shares and leverage, but also the spatial closure that links local support to wages, migration, and housing rents.

For expositional clarity, Section 3 presents the household side as a static intratemporal problem. The quantitative implementation used for the counterfactuals adds a standard representative-household Euler equation for intertemporal saving and capital accumulation, while preserving the same CES intratemporal utility over private consumption and welfare services. It does not add

idiosyncratic income risk, incomplete markets, or a buffer-stock self-insurance motive. Accordingly, the consumption decomposition below should be read as separating direct income effects, welfare complementarity, an intertemporal saving/deleveraging margin, and general equilibrium reallocation rather than as identifying literal precautionary saving in the incomplete-markets sense.

4.3.1 Calibration Strategy

We adopt a two-tier calibration approach. The first tier consists of parameters that can be measured directly or disciplined externally from the literature: the discount factor, capital share, depreciation rates, tax rates, and local tax-retention shares. These parameters anchor preferences, technology, and the fiscal architecture. The second tier consists of seven parameters that are disciplined internally by Chinese data and institutional targets: welfare-service complementarity, land-finance pass-through, land monetization, migration responsiveness, housing-market closure, career incentives, and debt discipline. Those parameters are calibrated using moments and institutional targets computed from Chinese provincial and prefectural data over 2008–2019.

To keep the quantitative exercise tied closely to observables, the calibration targets three groups of moments. First come aggregate expenditure and balance-sheet ratios: the infrastructure-investment share of GDP, the welfare-spending share, the private-consumption share, the debt ratio, and capacity utilization. These moments anchor the benchmark regime. Second come fiscal and land-finance moments, such as the VAT share, the importance of land-based revenue, and the elasticity of investment to collateral conditions; these pin down the local fiscal return to production-oriented spending. Third come spatial and sectoral moments, including the responsiveness of local population and housing costs to local conditions and the differential strength of production-oriented versus resident-oriented activities in generating local fiscal yield. Taken together, these moments discipline ε_L, $\bar{H}$, and the reduced-form two-block representation of sector-specific support.

4.3.2 Data Sources

We construct a balanced panel of 31 provincial-level regions over 2008–2019, supplemented by prefectural data from 283 cities for robustness analysis. Macroeconomic indicators including GDP, fixed asset investment, household consumption, population, and employment are drawn from the *China Statistical Yearbook*, the *China City Statistical Yearbook*, and the CEIC database. Infrastructure investment is measured as government spending on transport, energy, utilities, industrial parks, and related land-development outlays from the National Bureau of Statistics fixed-asset investment accounts, following the classification in Hao Shi, Shulin Guo and Wei Sun (2017). Welfare spending includes budgetary expenditures on education, healthcare, social security, environmental protection, and cultural services from Ministry of Finance reports.

Fiscal variables are obtained from multiple sources to ensure comprehensive coverage. VAT

revenue and business tax revenue (prior to the 2016 B2V reform) are from the Ministry of Finance. Land transfer fees, land-related taxes, and housing-market indicators are compiled from provincial fiscal yearbooks and the WIND database. Local government financing vehicle (LGFV) liabilities are constructed following Chen, He and Liu (2020), combining on-budget local government bonds with estimated LGFV debt from WIND and CEIC. Political turnover data and leadership cycle timing are from the China Political Elite Database maintained by Victor Shih, Christopher Adolph and Mingxing Liu (2012). In the empirical appendix, industrial land transactions provide a direct check on the high-yield production-support margin that is only observed indirectly in the main model.

4.3.3 Parameter Values and Model Fit

Table 1 reports the full calibration. Panel A lists externally calibrated parameters—the discount factor, capital share, tax rates, and the local retention shares that define the fiscal architecture—along with their sources. These parameters are either standard in the literature or directly observable from fiscal accounts and institutional rules, and they are not adjusted to fit the model. Panel B then turns to the seven parameters disciplined internally by the calibration strategy, together with the empirical or institutional targets used to pin them down. Panel C closes the loop by reporting those same seven internal targets alongside the corresponding model-implied counterparts for welfare-service demand elasticity, land-finance feedback, land monetization, migration responsiveness, housing-market closure, career incentives, and debt rollover discipline.

What gives this calibration bite is that the same baseline parameterization must organize the regime ladder, the wedge decomposition, and the policy counterfactuals. In the benchmark, it matches the seven internal targets reported in Panel C and also reproduces the headline post-2016 macro allocation ratios $I^G/Y = 7.4\%$, $S/Y = 16.3\%$, $C/Y = 36.0\%$, $D/Y = 31.2\%$, and capacity utilization of 80.9%. The same calibration must then recover the observed decline in κ from 1.22 to 0.32 and the softening of ζ from 3.56 to 0.80, while also reproducing the shift from political to fiscal wedge dominance across reform regimes.

One parameter deserves separate comment: the political career-intensity term κ. We allow κ to vary across reform regimes in order to capture the documented weakening of GDP-based promotion incentives after the late 2000s (Ye Chen, Hongbin Li and Li-An Zhou, 2005; Yang Yao and Muyang Zhang, 2015). The resulting regime-specific values are reported in Table 3 and become especially important in the period-by-period decomposition of Section 5.3.

4.4 Model Dynamics and Quantitative Results

We now use the calibrated model to analyze the contribution of each amplification channel to the observed macroeconomic outcomes. Table 2 compares steady-state allocations across five institu-

tional configurations that progressively introduce the fiscal wedge, political incentives, and debt access.

The quantitative results echo three implications of the model. First, fiscal structure alone sharply compresses welfare provision: moving from the social planner to the "fiscal only" regime lowers S/Y from 33.8% to 16.4% while keeping leverage near zero. In the current calibration, the large investment boom does not emerge from the baseline wedge alone; it emerges when fiscal incentives interact with amplification channels.

Second, political incentives and debt materially scale the distortion. Adding career incentives alone pushes I^G/Y to 43.9% and drives S/Y down to 2.0%. Adding legacy debt with weak career incentives keeps the infrastructure-to-welfare ratio elevated relative to the "fiscal only" baseline and raises leverage to 34.6% of GDP. Full amplification combines these forces to produce $I^G/Y = 13.5\%$, $S/Y = 11.4\%$, $D/Y = 37.9\%$, and capacity utilization of 78.1%.

Third, the "fiscal + legacy debt, weak career" scenario shows why weakening tournament incentives is not enough to restore balance once debt has accumulated. Even with a low promotion weight, debt overhang preserves a production-first allocation and prevents a full shift toward welfare-oriented spending. The model therefore suggests that fiscal architecture sets the direction of distortion, while political incentives and debt determine its scale.

5 Historical Decomposition and Policy Counterfactuals

The theoretical framework developed in Sections 3 and 4 establishes the local production-bias mechanism. This section takes that mechanism to the data through two complementary exercises. The first uses a business cycle accounting methodology inspired by V.V. Chari, Patrick J. Kehoe and Ellen R. McGrattan (2007) to decompose the historical contributions of fiscal, political, and financial forces to infrastructure investment across three institutional regimes in China. The second uses policy counterfactuals to ask whether the bias is better relieved by larger transfers or reduced by changing tax assignment.

The historical decomposition addresses a narrower empirical question than the paper's macro motivation. We ask whether the marginal driver of local public spending shifted from political promotion to fiscal returns on production. If that local mechanism is present, the broader macro implications follow from aggregation rather than being separately imposed.

The policy-counterfactual exercise matters for a different reason. Whereas the historical decomposition asks what sustained the observed distortion, the counterfactuals ask which institutional margin can unwind it. Larger transfers primarily relax fiscal scarcity, while tax reassignment changes the relative return to producers versus residents. That distinction makes the comparison informative even when the two reforms differ in their immediate welfare effects.

5.1 Methodological Framework: Wedge-Based Institutional Accounting

To empirically evaluate the relative importance of political, fiscal, and financial mechanisms at work in China's local production-bias model, we adopt an institutional accounting approach that extends the business cycle accounting framework of Chari, Kehoe and McGrattan (2007) to the Chinese context. The key empirical object is not a literal all-sector stock G_{ijt}, which is not observed in city-year data. Instead, we take to the data a composite production-support margin,

$$P_{it} \equiv \sum_{j=1}^{J} I_{ijt}, \tag{33}$$

which bundles infrastructure investment, industrial-park development, utilities, and other local outlays that support high-yield tradable activity. In the data, the most consistently observed component of P_{it} is infrastructure investment I_{it}^G. We therefore use I_{it}^G as the main proxy for the broader production-support margin, while sectoral composition, industrial land pricing, and local revenue structure shift the fiscal return to that proxy. The accounting exercise decomposes observed deviations from the planner's expenditure-composition condition into a fiscal wedge, a capital wedge, and a political wedge.

The theoretical foundation for this decomposition derives from Section 3. Consider a benevolent social planner who maximizes household welfare without local fiscal distortions. Let R_{it}^P denote the planner-side marginal social return to the composite production-support margin P_{it}. The planner's expenditure-composition Euler condition equates the marginal utility cost of reducing welfare today with the discounted marginal social gain from higher future productive capacity:

$$U_{S,it} = \beta \, \mathbb{E}_t \left[U_{S,i,t+1} \left(1 - \delta_g + R_{i,t+1}^P\right) \right].$$

This benchmark condition is the planner analogue of the baseline model: the social return to local production support is evaluated without origin-based retention, collateral wedges, or political rewards.

In the presence of China's institutional frictions, the observed allocation deviates from the planner's benchmark. For accounting purposes, we therefore define wedges directly on the planner equation so that a zero wedge exactly reproduces the planner allocation. The decentralized Euler equation from Section 4 then provides the structural interpretation of those wedges:

$$U_{S,it} = \beta \, \mathbb{E}_t \left[U_{S,i,t+1} \left(1 - \delta_g + R_{i,t+1}^P\right) \left(1 + \Theta_{it}^{\text{Fiscal}} + \Theta_{it}^{\text{Capital}} + \Theta_{it}^{\text{Political}}\right) \right]. \tag{34}$$

Each wedge captures a distinct institutional mechanism. The fiscal wedge $\Theta_{it}^{\text{Fiscal}}$ measures the reduced-form distortion created jointly by the extra local fiscal return to production support and the weaker fiscal return to resident-oriented welfare, as characterized structurally by the gap

between MFRI_{it} and MFRW_{it} in Lemma 2. In the data, this wedge is allowed to vary with retained VAT exposure, industrial composition, industrial land pricing, and the housing-rent capitalization generated by local conditions. The capital wedge $\Theta_{it}^{\text{Capital}}$ reflects the shadow value of borrowing capacity, which became particularly important after the expansion of LGFV financing post-2009 (Chen, He and Liu, 2020). When borrowing constraints are loose, local governments can front-load production-oriented support beyond contemporaneous fiscal capacity, increasing the effective return to projects that raise future collateral values. The political wedge $\Theta_{it}^{\text{Political}}$ captures residual production-support intensity not justified by fiscal or financial considerations, which we interpret as reflecting career-based incentives under the promotion tournament system (Li and Zhou, 2005). Substituting the decentralized Euler equation into (34) shows that the total wedge absorbs both the production-side bonus MFRI_{it} and the welfare-side fiscal offset MFRW_{it}; it is therefore not obtained by normalizing the latter away.

The decomposition proceeds by inverting equation (34) to infer wedge magnitudes from observed allocations. Given data on infrastructure investment I_{it}^{G}, welfare spending S_{it}, output Y_{it}, population, land-market outcomes, and borrowing conditions, we compute the total wedge directly from the Euler equation. Rearranging (34), the total wedge is the residual that rationalizes observed allocations as optimal:

$$1 + \Theta_{it}^{\text{Total}} = \frac{U_{S,it}}{\beta \, \mathbb{E}_t \left[U_{S,i,t+1} \cdot \left(1 - \delta_g + R_{i,t+1}^{P}\right) \right]}, \tag{35}$$

where all marginal utilities and marginal return objects are evaluated at observed data or their empirical proxies. When allocations coincide with the social planner's, $\Theta_{it}^{\text{Total}} = 0$ by construction; positive values indicate that the continuation value attached to production-oriented support in the decentralized allocation exceeds the undistorted planner benchmark. The structural wedge from (35) maps into the observed infrastructure share through the model's policy function. Specifically, the model implies a nonlinear mapping $I_{it}^{G}/Y_{it} = h(\Theta_{it}^{\text{Total}}; \mathbf{s}_{it})$ where $\mathbf{s}_{it}$ is the local state vector. Because I_{it}^{G} is the observed infrastructure-intensive component of the broader production-support margin P_{it}, this mapping should be interpreted as a proxy relationship rather than as a literal one-sector identity. The percentage deviation of the investment share from the planner's benchmark,

$$\Delta_t^{I/Y} = \frac{I_t^{G}/Y_t - I_t^{G,\text{Planner}}/Y_t}{I_t^{G,\text{Planner}}/Y_t}, \tag{36}$$

is an *endogenous consequence* of the structural wedge $\Theta_{it}^{\text{Total}}$, not an alternative definition. Because the policy function $h(\cdot)$ is monotonically increasing in the wedge, the investment deviation is a valid summary statistic for the magnitude of distortion, but all quantitative exercises compute wedges from the Euler equation (35) and then simulate the implied allocations through the model's decision rules. We then decompose the total wedge into its components using identifying restrictions

derived from the model structure and auxiliary data on fiscal revenues, land values, borrowing costs, industrial composition, and political turnover cycles.

We implement the decomposition separately for three institutional regimes that correspond to distinct phases of China's development: the promotion-dominant era (1998–2008), when strong GDP-based career incentives operated alongside the pre-2009 VAT system; the transition era (2009–2015), when the 2009 VAT reform reset the fiscal return to capital-deep investment and the post-crisis stimulus interacted with land finance and LGFV expansion; and the fiscal-survival regime (2016–2019), when B2V further re-ranked services relative to manufacturing within the same retained-value-added logic. This regime-based approach allows us to trace how the source of distortion moved from promotion pressure, to land- and debt-backed expansion after 2009, to a post-2016 manufacturing and production bias rooted in retained VAT and collateral values.

5.2 Data and Calibration for Historical Decomposition

Turning from the model to the decomposition exercise, this subsection lays out the data sources and calibration strategy used in the historical accounting. Although the core model parameters carry over from Section 4.3, the business cycle accounting step requires additional parameters governing wedge dynamics and identification restrictions that allow us to separate the contributions of fiscal, political, and capital-market frictions.

5.2.1 Data Construction

We construct a prefecture-level panel covering 283 cities during 1998–2019 to discipline the wedge dynamics. This geographic granularity is essential because the fiscal wedge operates at the local government level, and prefectures exhibit substantial heterogeneity in fiscal capacity, debt burdens, and political turnover patterns that would be obscured at the provincial level (Gang Fan, Yan Lv and Xiaolu Wang, 2016).

Macroeconomic indicators including GDP, fixed asset investment, household consumption, employment, and resident population are drawn from the *China City Statistical Yearbook* and the CEIC database. We measure infrastructure investment as the sum of government spending on transportation, energy, utilities, industrial parks, and related land-development projects from the National Bureau of Statistics fixed-asset investment accounts, following the classification methodology of Shi, Guo and Sun (2017). Welfare spending encompasses budgetary expenditures on education, healthcare, social security, environmental protection, and cultural services from prefectural fiscal reports. This is the empirical counterpart to the model's expenditure split between resident-oriented spending and production-oriented support.

Fiscal variables require careful construction to capture the distinct revenue channels that generate the fiscal wedge. VAT revenue and business tax revenue (prior to the 2016 B2V reform)

are obtained from the Ministry of Finance and matched to prefectures using provincial allocation formulas documented in Yongzheng Liu and Jorge Martinez-Vazquez (2022). Land transfer fees, residential price indicators, and industrial land transactions are compiled from provincial fiscal yearbooks and cross-validated against the WIND database. We construct the land revenue series following Tao et al. (2010), who document the central role of land leasing in local public finance. Population and housing outcomes are used to discipline the migration and capitalization channel through which welfare spending can still generate a positive but weaker fiscal return.

Local government financing vehicle (LGFV) liabilities present particular measurement challenges because much of this debt is off-budget. We follow the methodology of Chen, He and Liu (2020), combining on-budget local government bonds with estimated LGFV debt from WIND and CEIC. The resulting debt series exhibits the characteristic post-2009 surge documented in the literature, with the debt-to-GDP ratio rising from approximately 20 percent in 2007 to over 60 percent by 2016 (Huang, Pagano and Panizza, 2020).

Political turnover data and leadership cycle timing are from the China Political Elite Database maintained by Shih, Adolph and Liu (2012). We construct a proxy for career incentive intensity κ_{it} based on the age of the prefecture party secretary, years until expected rotation, and the provincial-level emphasis on GDP growth in cadre evaluation, following the approach of Li and Zhou (2005) and Chen, Li and Zhou (2005).

5.2.2 Calibration Strategy for Wedge Identification

The decomposition of the total wedge into fiscal, capital, and political components requires identification restrictions that connect each wedge to observable data. Our strategy combines moment matching with institutional priors derived from the theoretical model.

The fiscal wedge $\Theta_{it}^{\text{Fiscal}}$ is identified from the co-movement between observed production-oriented spending and net fiscal returns. Specifically, the object disciplined by the data is the gap between the production-support-side return and the welfare-side return, $\text{MFRI}_{it} - \text{MFRW}_{it}$. On the production-support side, we use retained VAT exposure, industrial composition, output growth, land revenue, and industrial land pricing to measure the direct production and capitalization channels. On the welfare side, we use social spending, resident population responses, and housing-value movements to proxy the weaker migration-and-rent-capitalization channel associated with public services. The fiscal wedge is then pinned down by the condition that infrastructure-intensive local support responds to expected net fiscal returns with an elasticity that matches the observed correlation between I_{it}^{G}/Y_{it}, lagged VAT revenue growth, land revenue growth, industrial exposure, and housing-value movements associated with welfare provision.

The capital wedge $\Theta_{it}^{\text{Capital}}$ is identified from the relationship between production-oriented investment and borrowing conditions. We use two moments: the spread between LGFV bond yields and central government bonds as a measure of borrowing costs, and the ratio of new LGFV is-

suance to GDP as a measure of credit access. The capital wedge is calibrated to match the observed elasticity of investment with respect to these financing variables, conditional on the fiscal wedge and the local land-collateral base.

The political wedge $\Theta_{it}^{\text{Political}}$ is identified from the residual variation in the total wedge after accounting for fiscal and capital effects. Rather than treating this entire residual as political, we impose additional structure by requiring that the political wedge co-moves with observable proxies for career incentives: the age-based promotion probability following Li and Zhou (2005), the timing of party congresses, and the anti-corruption campaign intensity after 2012 (Ting Chen and James Kai-sing Kung, 2019). Residual variation that does not co-move with these proxies is assigned to a separate measurement-error category (reported as "Residual" in Table 4), ensuring that we do not mechanically attribute all unexplained variation to political factors when the more basic production-support and solvency channels already account for the bulk of the variation.

For ease of reference, the additional parameters needed for the wedge decomposition—elasticities, budget-discipline coefficients, and wedge persistence—are reported alongside the institutional accounting parameters in Table 3, rather than being introduced piecemeal later in the discussion.

5.2.3 Target Moments for Wedge Dynamics

The wedge decomposition is disciplined by simulated time-series diagnostics together with the regime-specific wedge shares that anchor the institutional accounting (Table 4, Panel A).

The calibration ensures that the model captures both the aggregate dynamics of infrastructure investment and the shifting composition of wedge contributions across regimes. The declining cross-sectional correlation between investment and leader age is particularly informative: in the pre-2009 regime, younger leaders (who have stronger promotion incentives) are associated with higher investment, consistent with the Mandarin Model. By 2016–2019, this relationship has largely disappeared, indicating that fiscal survival rather than career advancement drives investment decisions. The model's ability to replicate this pattern provides confidence that the wedge decomposition captures the true institutional dynamics rather than spurious correlations.

5.3 Historical Decomposition: The Shift from Political to Fiscal Dominance

Against that background, the wedge decomposition points to a striking institutional transformation over the past two decades. Table 4 reports the time-varying contributions of fiscal and political wedges to observed infrastructure investment—our empirical proxy for the broader production-oriented support margin. The detailed accounting for each institutional regime appears in Sections 5.3.1–5.3.3 below, but the headline result is already clear: the mechanism sustaining local production bias shifted fundamentally from political ambition to fiscal survival.

Although Section 5 defines three structural wedges—fiscal (Θ^{Fiscal}), capital (Θ^{Capital}), and

political ($\Theta^{\text{Political}}$)—the results in Table 4 report two substantive categories. Because the capital wedge operates through land-collateral dynamics that are themselves a consequence of origin-based fiscal incentives (Proposition 6), we aggregate Θ^{Capital} into the fiscal category throughout the historical decomposition. The "fiscal wedge" reported here therefore captures both the direct tax-base channel (retained VAT and consumption-tax revenue) and the indirect land-collateral channel (LGFV borrowing backed by housing values), while the political wedge remains the disciplined residual linked to career-incentive proxies.

Throughout this section, "infrastructure investment" should be read as the observed infrastructure-intensive component of the broader production-oriented support margin defined in Section 5. The data do not observe the full allocation across all I_{ijt}, but they do observe the category of local spending most tightly linked to industrial parks, logistics, utilities, and land development. We therefore use infrastructure investment as an empirical proxy for the broader production-support margin, not as a claim that local production bias operates only through roads or concrete.

We now examine each institutional regime in detail, tracing the mechanisms through which political incentives gave way to fiscal survival as the primary driver of observed production-oriented support.

5.3.1 Period I: The Pre-2009 Tournament Regime (1998–2008)

The decade preceding the Global Financial Crisis represents the height of the political promotion tournament in China. Our institutional accounting results demonstrate that political incentives were the dominant force behind observed infrastructure-intensive production support during this period. The political wedge explains 54.9 percent of total panel variation in that proxy, while fiscal distortions account for 38.1 percent. This pattern is consistent with the Mandarin Model's core prediction: GDP growth performance served as a central determinant of cadre promotion, and officials accordingly prioritized production-oriented support that could rapidly boost measured output.

The estimated values of the career incentive parameter corroborate this interpretation. As reported in Table 3, the calibrated pre-2009 value is $\kappa_t = 1.22$. Values above unity indicate that local officials placed equal or greater weight on political advancement relative to the social welfare objective, creating strong incentives to pursue rapid, measurable economic growth through production-led development strategies, of which infrastructure was the most visible observed component.

Several features of this period distinguish it from later regimes. First, budget constraints remained relatively hard, with the regime-level discipline parameter at $\zeta_t = 3.56$ in Table 3. This fiscal discipline constrained debt-backed expansion and kept the local growth strategy closer to the classic tournament logic. Second, the combination of strong career incentives and constrained resources produced efficiency gains: regression elasticities indicate that a one-standard-deviation

increase in κ_{it} accounted for roughly seventeen percent of variation in total factor productivity growth. Third, the reduced-form windows in Table 5 show that fixed-asset investment and real-estate activity remained well below their post-2009 levels, with FAI/GDP at 36.1 percent and real estate/GDP at 7.1 percent. The pre-2009 regime was therefore investment-oriented, but it was not yet dominated by land-finance and debt-backed expansion.

5.3.2 Period II: The 2009 VAT Reform and Debt Expansion Era (2009–2015)

The 2008 Global Financial Crisis and the 2009 VAT reform together mark the transition away from the classic Mandarin Model. The wedge decomposition reveals a dramatic reversal: political incentives weakened significantly, yet the observed infrastructure-intensive proxy for production-oriented support not only persisted but intensified. This pattern is inconsistent with a pure tournament story, but it is consistent with a fiscal mechanism whose internal composition was being reset.

The 2009 reform converted VAT from a production-type tax into a consumption-type tax by allowing deduction of fixed-asset purchases. Relative to the pre-2009 regime, this reduced the special fiscal premium from attracting capital-intensive firms whose equipment spending had previously enlarged the VAT base more directly. But it did not neutralize local production bias. At the same moment, post-crisis stimulus policy and the rapid expansion of LGFVs relaxed financing constraints. Local governments therefore shifted from a strategy centered on taxing capital-deep investment to one centered on expanding broad industrial value added, industrial land demand, and collateralizable land values. The fiscal wedge share correspondingly rose from 38.1 percent to 68.9 percent, indicating that a different mechanism had become dominant.

The estimated career incentive parameter κ_t falls sharply from above one prior to the crisis to 0.47 over 2009–2015, as shown in Table 3. Under the pure Mandarin Model, such a decline in the value of GDP growth for official promotion should have triggered a substantial contraction in observed public investment. The data show the opposite. The budget-discipline parameter likewise drops to $\zeta_t = 1.06$, indicating much softer financing constraints than in the pre-2009 regime. Local government financing vehicles (LGFVs) provided credit access implicitly backed by the central government's commitment to fiscal stability (Chen, He and Liu, 2020). As borrowing constraints relaxed, the broader production-support margin became dominated by future revenue capacity and collateral values rather than by political incentives alone.

The debt–investment–land nexus also shows up clearly in the reduced-form moments. Table 5 reports that FAI/GDP jumps from 36.1 percent in the pre-2009 window to 64.1 percent in 2009–2015, real-estate activity rises from 7.1 to 12.2 percent of GDP, and budget revenue rises from 5.9 to 8.9 percent of GDP. These shifts are consistent with a regime in which expanding land values and broad industrial tax bases became central to local solvency. Local governments continued to invest not in pursuit of promotion alone but to ensure the fiscal resources necessary to avoid distress. This was the first tax step in the same repricing logic later sharpened by the 2016 reform.

5.3.3 Period III: The 2016 B2V Consolidation of the Same Tax Logic (2016–2019)

The 2016 B2V reform should be read as the second tax step in the same fiscal logic rather than as a separate story. If the 2009 reform changed which types of producers were most attractive within the VAT base, the 2016 reform changed the ranking between services and manufacturing. By replacing a fully local Business Tax base with a shared VAT base, and by moving the central-local VAT split to 50:50, the reform lowered the direct local fiscal return to service-sector expansion relative to the old regime while increasing the budgetary importance of origin-based value added (Ministry of Finance of China, 2016). Consumption taxes remained centralized, and welfare spending continued to generate mainly indirect returns through migration and land-rent capitalization. The post-2016 result was therefore a tighter linkage between local solvency, manufacturing activity, and production-oriented infrastructure.

The estimated value of κ_t remains low during this period, at 0.32 as reported in Table 3. This represents a further decline from the already-weakened values of the 2009–2015 era. The political wedge share correspondingly falls to just 14.6 percent—less than one-third of its pre-crisis level. In contrast, ζ_t stays soft at 0.80, reflecting continued reliance on debt-financed investment to maintain solvency rather than any restoration of financial discipline. The relatively high locally retained VAT parameter η_v (Table 3) ensures that a substantial share of future value added accrues locally, strengthening the incentive to invest in production capacity regardless of diminishing marginal productivity.

The fiscal wedge share now exceeds 78 percent (Table 4), indicating that the proxy we observe in the data is no longer politically motivated but determined by the basic arithmetic of fiscal survival. Local governments support production because they must: the alternative is default on accumulated debt obligations or cuts to essential services. This logic operates independently of whether officials expect promotion rewards from high GDP growth.

Industrial overcapacity becomes entrenched during this period. In the calibrated post-2016 baseline, capacity utilization remains low at about 80.9 percent—a level consistent with a regime in which expanding production is required to sustain cash flow and avoid insolvency. The fiscal trap prevents rebalancing toward a consumption-led growth model: local governments must protect the production-based tax base even when returns fall and inventories surge.

The consequences extend beyond investment misallocation. Debt service requirements crowd out higher-return private investment, and aggregate TFP declines despite continued capital expansion.

5.4 Variance Decomposition and Empirical Assessment

To quantify the relative contributions of fiscal versus political forces to local production-support behavior, we conduct a variance decomposition of the observed infrastructure-investment share

over 2008–2019. Because infrastructure investment is the main observed proxy for the broader production-support margin, this decomposition should be read as a decomposition of the most visible component of local production-oriented support. The results in Table 4 reveal that fiscal channels, comprising both land collateral dynamics and production-based tax revenues, account for the overwhelming majority of that volatility. Specifically, fiscal determinants explain 71.6 percent of total variance. This indicates that local governments adjust observed production-oriented support primarily in response to revenue and borrowing conditions, rather than shifts in political incentives or expectations about productivity.

Within the fiscal category, land yield shocks alone contribute 40.3 percent of total variance. This reflects the dual role of land: first, as a collateral asset underpinning LGFV borrowing capacity; and second, as a direct source of budgetary revenue through land leasing. When land prices rise, borrowing constraints relax, refinancing becomes easier, and observed infrastructure-intensive support accelerates. Conversely, land market slowdowns tighten fiscal conditions, forcing municipalities to scale back projects. The strong relationship between the proxy we observe and land revenue volatility underscores that the land market, rather than political cycles, became the chief driver of local production-support dynamics after 2008.

VAT and TFP shocks account for an additional 31.3 percent. Because industrial production generates future retained VAT, increases in manufacturing profitability or expected value added incentivize local governments to expand the infrastructure-intensive component of production-oriented support, including industrial clusters, logistics, and power capacity. The result is a revenue-driven accelerator effect: fiscal expectations tied to the industrial cycle propagate strongly into the volatility of the observed proxy.

By contrast, political cycles—proxied by changes in κ_t associated with promotion incentives—explain only 21.2 percent of the variance. While non-negligible, this diminished role indicates that performance-based career concerns were no longer the main marginal driver of spending decisions in the post-2009 regime. The political tournament lost its dominant influence due to a combination of institutional factors documented earlier: increased emphasis on risk control, anti-corruption pressures, and the informal decoupling of GDP performance from cadre evaluation.

A modest residual of 7.2 percent remains, likely reflecting local policy discretion, measurement error, and unobserved idiosyncratic shocks that are not captured by the three wedges.

Taken together, the decomposition suggests that, in the current institutional environment, revenue mechanics rather than political ambition determine the observed infrastructure-intensive component of local production support. That is the empirical counterpart of the paper's core local production-bias result.

Read alongside the theoretical results in Sections 3 and 4, these empirical patterns line up closely with the fiscal-incentives mechanism developed earlier.

5.5 Robustness and Sensitivity Analysis

This section examines whether the dominance of the fiscal wedge is sensitive to specific parameter choices or filtering methods. Three potential concerns are addressed: altered time preferences, variations in the softness of budget constraints, and alternative detrending techniques.

5.5.1 Capital Utilization, Overcapacity, and Depreciation Costs

The baseline model assumes that infrastructure always augments effective production capacity with constant utilization rates. In reality, a defining feature of China's post-2009 experience is persistent overcapacity in heavy industries and real estate, reflecting that new capital is frequently deployed even when demand is insufficient. To ensure that our findings are not sensitive to the baseline utilization assumption, we extend the model to include endogenous capital utilization u_t and a convex depreciation cost function $\delta(u_t)$ that rises with excess utilization. This modification allows both underuse (idle capacity) and overuse (accelerated depreciation) to affect the marginal product of capital.

This extension changes the continuation payoff to production support, but it does not replace the local government's shadow-value Euler equation from Section 4. Suppressing locality and sector indices, let $\widetilde{Y}_{t+1}$ denote realized net output after utilization and wear, for example

$$\widetilde{Y}_{t+1} \equiv u_{t+1} Y^{\text{pot}}_{t+1} - \delta(u_{t+1}) K_{t+1}.$$

Then the relevant investment condition becomes

$$\frac{U_{S,t}}{1 - \text{MFRW}^{GE}_t} = \beta \, \mathbb{E}_t \left[\frac{U_{S,t+1}}{1 - \text{MFRW}^{GE}_{t+1}} \left(1 - \delta_g + \widetilde{R}^{P,GE}_{t+1} + \widetilde{\text{MFRI}}^{GE}_{t+1}\right) \right],$$

where

$$\widetilde{\text{MFRI}}^{GE}_{t+1} \equiv \eta_v \tau_v \frac{\partial \widetilde{Y}_{t+1}}{\partial G_{t+1}} + \eta_c \tau_c \frac{\partial C_{t+1}}{\partial G_{t+1}} + \tau_h \bar{H} \frac{\partial q_{t+1}}{\partial G_{t+1}}.$$

Here $\widetilde{R}^{P,GE}_{t+1}$ is the corresponding utilization-adjusted planner-side social return to production support. Low utilization reduces $\partial \widetilde{Y}_{t+1} / \partial G_{t+1}$ because newly installed capacity is not fully used, while high utilization raises the depreciation penalty embedded in $\delta(u_{t+1})$. The key point is therefore unchanged: overcapacity weakens both the social return and the fiscal return to production support, but the government still compares that net production-side return with the welfare-side return MFRW^{GE}_t through the same shadow value of funds as in the baseline model.

We recalibrate the model to match persistently low post-2016 utilization, around 81 percent in the baseline, while preserving the broader shift from tighter pre-2009 discipline to later overcapacity. The decomposition results remain qualitatively unchanged. Fiscal factors continue to explain more than 70 percent of investment volatility, while the political component contributes less than 15

percent. Overcapacity dampens the productivity channel of investment but does not diminish the fiscal incentive to expand the tax base and collateral values. Investment persists because solvency requirements depend on the scale of production rather than its marginal return.

The robustness exercise confirms that excessive capital accumulation is a rational response under the current fiscal structure. Even when the profitability of additional industrial capacity declines and depreciation accelerates, local governments continue to invest because the alternative is a deeper erosion of the fiscal base and an increased risk of default. The overcapacity outcome is not an aberration or modeling artifact, but a stable equilibrium feature of the system once fiscal survival becomes the paramount motive.

5.5.2 Alternative Time Preferences

We test whether the dominance of fiscal shocks is sensitive to the assumed degree of patience by substantially lowering the discount factor to $\beta = 0.90$. Even under this heightened myopia, fiscal shocks still account for approximately 70 percent of the post-2009 variance in the infrastructure-investment proxy for production-oriented support. Greater impatience strengthens the responsiveness of that proxy to fluctuations in revenue and debt service capacity, reinforcing rather than undermining the fiscal-incentives mechanism.

5.5.3 Variations in the Soft Budget Constraint

Concerns that the post-2009 infrastructure-investment proxy merely reflects unconstrained borrowing are addressed by lowering the financial-discipline parameter ζ. A reduced ζ temporarily increases sensitivity of investment to political cycles, since governments can more easily borrow to signal favorable performance. Over time, however, accumulating debt service obligations impose an endogenous constraint: borrowing increasingly funds refinancing rather than new projects. This transition shifts the mechanism from revenue determinism to debt determinism, sustaining the broader production-support bias despite weakening promotion incentives.

5.5.4 Alternative Filtering Methods

We replicate the decomposition using the Hamilton filter instead of the HP filter to ensure that results are not dependent upon detrending choices. The observed procyclicality of the infrastructure-investment proxy with land-related revenue remains highly stable, with correlations of 0.60 under the Hamilton filter and 0.62 under the HP filter. The dominance of fiscal shocks is therefore robust to alternative signal extraction methods.

The full set of robustness exercises confirms that the empirical evidence presented in Section 5.3 is not driven by calibration artifacts or data-processing choices. Across all specifications, the

fiscal wedge consistently governs both the trend and the cyclical behavior of the infrastructure-investment proxy. Political incentives played a key role only when combined with binding fiscal and financial discipline in the pre-2009 era. After 2009, debt-financed investment persisted because maintaining a sufficiently large tax base became essential for solvency.

Additionally, the post-2016 baseline retains the fundamental fiscal asymmetry established in Section 3: with η_c well below η_v (Table 3), welfare spending continues to offer only a weak direct tax return relative to production-oriented activity. The combined evidence supports the interpretation that local production bias is increasingly shaped by fiscal incentives and tax assignment rather than by political tournament incentives alone.

When aggregated across jurisdictions, the mechanisms documented in this paper point to an economy driven increasingly by fiscal arithmetic. A durable transition toward welfare-enhancing and consumption-driven development requires a reconfiguration of local revenue institutions, particularly through reforms that provide local governments with a direct fiscal return to household welfare and service provision.

5.6 Policy Counterfactuals and Welfare Analysis

Having shown that the infrastructure–welfare imbalance is an equilibrium outcome of China's fiscal architecture, we now turn to the natural policy question: which institutional changes would actually weaken that local production bias? Using the calibrated dynamic model, we compare two reform margins: expanding transfers while keeping tax assignment fixed, and changing tax assignment so that local governments have a larger fiscal stake in household demand.

The benchmark for both counterfactuals is the post-2016 calibration reported in Table 1 and Table 3, where $\eta_v = 0.50$ and $\eta_c = 0.18$. In this reduced-form mapping, η_c captures the limited locally retained service-side fiscal return that remains after B2V, not a literal locally assigned retail consumption tax.

That contrast is useful because the two reforms operate on different margins. Transfers primarily provide resource relief, whereas tax reassignment changes marginal incentives. We also report the aggregate implications for consumption, leverage, and utilization, but those outcomes should be read as downstream consequences of the local incentive problem.

5.6.1 Counterfactual A: Addressing VFI Through Transfers

A common policy prescription argues that over-investment reflects a shortage of local fiscal resources. In this scenario, the central government increases unconditional transfers to prefectures by the equivalent of 5 percent of GDP, while retaining the current post-2016 tax-sharing structure, including the limited service-side retention parameter $\eta_c = 0.18$. This closes the Vertical Fiscal Imbalance gap without modifying marginal incentives.

The simulations show that while aggregate fiscal pressure is relieved, the composition of local expenditure remains tilted toward production. The shadow price of government funds falls, enabling both higher welfare spending and higher infrastructure outlays. Welfare spending rises from 16.3 to 20.2 percent of GDP, but the infrastructure-investment proxy also rises from 7.4 to 8.4 percent because the underlying production-side fiscal return is unchanged. Put differently, the transfer loosens the budget constraint without changing the ranking embedded in it: once local governments have more room to spend, they expand both resident-oriented and production-oriented items, but they still regard production support as the more fiscally attractive margin.

The effect on private consumption is modest: the consumption share rises from 36.0 to 37.4 percent of GDP, an increase of 1.4 percentage points. Debt falls only slightly, from 31.2 to 29.6 percent of GDP, and capacity utilization improves from 80.9 to 82.7 percent. These movements are directionally favorable, but they are not large enough to constitute a genuine change in the local growth model. In the current calibration, the main benefit of this reform is therefore direct welfare relief rather than durable rebalancing of local incentives. Additional transfers mitigate the symptoms of fiscal distress, but because they leave the marginal ranking of fiscal returns unchanged, local governments still allocate part of the new fiscal space toward infrastructure and preserve the basic production bias.

5.6.2 Counterfactual B: Structural Tax Reform

We next simulate a reform that changes the fiscal calculus governing local spending. Specifically, we raise the local service-side retention parameter from its post-2016 baseline value of $\eta_c = 0.18$ to $\eta_c = 0.50$, while adjusting η_v to keep local own-source revenue unchanged in steady state. Because a higher η_c adds a stronger direct tax channel to the existing rent-capitalization channel, the marginal fiscal return on welfare rises sharply:

$$\text{MFRW}_{it}^{GE} = \eta_c \tau_c \frac{dC_{it}}{dS_{it}} + \tau_h \bar{H}_i \frac{dq_{it}}{dS_{it}} > 0.$$

In the current calibration, this reform works primarily through composition rather than a large jump in welfare provision. Welfare spending remains at 16.3 percent of GDP, but the infrastructure-investment proxy declines from 7.4 to 6.6 percent, debt falls from 31.2 to 26.7 percent of GDP, and capacity utilization rises to 84.4 percent. That pattern is economically important. The absence of a large increase in S/Y does not mean the reform is weak; rather, it means that the main adjustment occurs by reducing over-investment instead of mechanically expanding every category of social spending. Once welfare and household demand generate a more meaningful local fiscal return, governments no longer need to lean as heavily on production expansion to protect revenue and collateral values.

The consumption response is nonetheless meaningful. Private consumption rises from 36.0 to

40.2 percent of GDP, an increase of 4.2 percentage points. In this experiment, the gain comes less from a discrete increase in public-service provision than from a lower intertemporal saving rate, reduced balance-sheet pressure, and a general equilibrium reallocation toward household demand. The welfare gain is positive but modest—0.19 percent in ECV terms—because the reform is revenue-neutral and does not relax fiscal scarcity as directly as the transfer counterfactual. The implication is that incentive reform may look less powerful in a short-run welfare metric even when it is more powerful as a rebalancing device. What it changes is not the immediate size of the fiscal envelope, but the direction in which local governments find it optimal to use that envelope.

5.6.3 Consumption Dynamics: The Key to Rebalancing

The starkly different consumption responses under the two counterfactuals illuminate why the composition of reform matters more than its magnitude. Table 6 decomposes the change in private consumption under each scenario into its constituent channels.

Under Counterfactual A, the 1.4-point increase in consumption is spread across several small channels. Direct income effects contribute 0.2 points, welfare-consumption complementarity 0.5, lower saving and deleveraging 0.5, and general equilibrium effects 0.2. No single mechanism dominates. This pattern is exactly what one would expect from a reform that loosens the fiscal constraint while leaving the production-versus-consumption tax ranking largely intact: households benefit somewhat from higher services and slightly easier balance-sheet conditions, but there is no strong compositional shift in the local economy.

Under Counterfactual B, almost the entire gain comes from lower saving and general equilibrium reallocation. The saving/deleveraging channel contributes 3.1 points and general equilibrium effects 1.0 point, while direct income and welfare-complementarity effects are approximately zero in the current calibration. This decomposition is informative because it shows that the reform works less by directly purchasing more welfare and more by reducing the need for a production-led fiscal strategy. Once household demand carries a higher local fiscal return, the economy can support higher consumption with less leverage and less pressure to overbuild capacity.

The divergence in consumption responses also clarifies the aggregate stakes. Under Counterfactual A, the consumption share remains low relative to international norms, and the model economy continues to rely more heavily on investment and external demand. Excess capacity remains more pronounced because production growth outpaces domestic demand growth. In that sense, even a transfer package large enough to matter for local budgets leaves the economy relatively dependent on the same production-led adjustment margin.

Under Counterfactual B, the consumption share rises more strongly and leverage falls, reducing dependence on production-led balance-sheet expansion. Industrial capacity utilization recovers as domestic consumption absorbs a larger share of output. These consumption dynamics are central to understanding why tax reassignment rebalances the economy even when its welfare gain is smaller

than that of direct transfers in the current calibration: it changes the propagation mechanism linking local fiscal incentives to aggregate demand.

Figure 4 illustrates the transition path of the consumption share under each policy scenario. Under the baseline, consumption remains near 36.0 percent of GDP. Counterfactual A produces a modest increase to approximately 37.4 percent. Counterfactual B generates a larger transition, with consumption rising toward 40.1 percent within the simulation horizon. The figure therefore reinforces that tax reassignment is not just changing a terminal steady state; it changes the path of adjustment itself by shifting demand upward more persistently. Even after this adjustment, the consumption share remains below middle-income and OECD benchmarks, indicating that tax reassignment helps but does not on its own eliminate China's consumption gap.

5.6.4 Welfare Evaluation

To quantify welfare consequences, we compute the Equivalent Consumption Variation (ECV), measuring the proportional increase in consumption required to make households indifferent between the baseline equilibrium and each reform scenario. Table 6 reports the key outcomes.

The welfare comparison sharpens an important distinction that the quantity results alone could obscure. Expanding transfers delivers the larger contemporaneous welfare gain because it directly relaxes local fiscal scarcity. Households benefit immediately from higher effective resources and higher welfare spending, so the ECV gain reaches 3.49 percent. But that larger short-run welfare gain should not be read as evidence that transfers solve the underlying distortion. Because local governments still face the same production-skewed marginal incentives, the reform improves the level of local welfare while leaving the basic composition problem largely intact.

Modifying the tax-sharing arrangement operates through a slower but more structural margin. By weakening the privileged fiscal return to production, tax reassignment lowers infrastructure spending and debt while raising consumption and utilization, yet the measured ECV gain is only 0.19 percent because the reform is revenue-neutral and does not provide a direct resource windfall. In welfare terms, it is therefore weaker as immediate relief but stronger as institutional correction.

Taken together, the results point to a policy tradeoff between resource sufficiency and incentive alignment. If the objective is short-run stabilization of fiscally stressed localities, transfers are more powerful. If the objective is durable rebalancing away from production-led local growth, tax reassignment is more powerful. The broader implication is that a serious reform package would likely need both margins: transfers to cushion the fiscal adjustment, and tax reassignment to change the direction of local incentives.

6 Empirical Evidence: Fiscal Pressure and Industrial Land Pricing

The preceding sections establish that origin-based tax assignment creates a fiscal wedge favoring production over welfare (Proposition 1), that land-backed borrowing amplifies this bias (Proposition 6), and that career incentives interact super-additively with fiscal pressure (Proposition 7). The structural decomposition in Section 5 recovers these channels from aggregate optimality conditions, showing that the fiscal wedge has increasingly dominated infrastructure investment as the political wedge has weakened. This section provides independent, reduced-form micro evidence on one specific margin predicted by the model: industrial land pricing. The model implies that when fiscal pressure on local governments intensifies—that is, when own-source revenue falls and the need to attract production tax base becomes more urgent—local governments should intensify production-oriented support, including the strategic discounting of industrial land to attract manufacturing. The 2016 B2V reform provides a natural experiment for this prediction. By replacing a fully local business-tax base with shared VAT, the reform reduced local fiscal capacity in cities that had relied heavily on business tax, creating differential pressure across cities to compete for manufacturing activity whose 17-percent VAT rate now represented the most valuable remaining production-tax base. The magnitude of this fiscal shock varied across cities according to their pre-reform tax composition (the parameters η_v and η_c in the model's notation). The institutional details of this reform are described in Section 2.

We distinguish two objects that appear in different parts of the paper. The *fiscal wedge* (Θ^{Fiscal}) is a structural concept recovered from the model's optimality conditions in Section 5. The *fiscal exposure* measure defined below is a reduced-form treatment variable constructed from observable pre-reform tax composition. The two are related—both capture how intergovernmental tax assignment shapes local incentives—but they are identified from different data and different assumptions. The structural wedge captures the full general equilibrium response of local investment to the tax architecture; the reduced-form exposure isolates the mechanical revenue loss from one specific reform episode. To the extent that the reduced-form estimates align with the structural predictions, they corroborate the model's core mechanism through an entirely independent empirical strategy.

6.1 Data and Sample

The analysis draws on three data sources. First, parcel-level land transaction records come from the China Land Market (*Zhongguo Tudi Shichang Wang*), the official platform administered by the Ministry of Natural Resources. Each record includes the parcel location, transaction date, transfer price, parcel area, land-use type, land grade, lease term, and industry classification. We restrict attention to industrial land transfers with positive transaction prices. Second, city-level fiscal data come from the *China City Statistical Yearbook* (*Zhongguo Chengshi Tongji Nianjian*), from which

we extract business-tax revenue, domestic VAT revenue, and general public budget revenue for each prefecture-level city and year. Third, official characteristics—name, birth year, appointment date, and position of each city's party secretary and mayor—are hand-collected from publicly available government records and news archives. These data allow us to construct tenure length, retirement proximity, and individual fixed effects for local leaders.

The estimation sample covers 2007 through 2019. The start date aligns with the implementation of the 2007 industrial land minimum-price policy by the Ministry of Land and Resources (Guotuzi Fa [2006] No. 307), which established a nationally determined floor on industrial land transfer prices indexed to land grade. This policy provides the statutory benchmark needed to construct the dependent variable. We exclude the four centrally administered municipalities—Beijing, Shanghai, Tianjin, and Chongqing—which face different fiscal arrangements and land-market dynamics. The final estimation sample contains over 540,000 industrial land transactions across approximately 280 prefecture-level cities.

6.2 Variable Definitions

Dependent variable. The outcome variable measures how far an industrial land transaction price lies above the nationally mandated minimum-price floor:

$$\text{Ind_Land_Diff}_{ict} = p_{ict} - \underline{p}_{ict}, \tag{37}$$

where p_{ict} is the unit transfer price in RMB per square meter for industrial parcel i in city c and year t, computed as total transaction amount divided by parcel area, and $\underline{p}_{ict}$ is the statutory minimum price applicable to the parcel's land grade under the 2007 policy. We refer to this variable as the *industrial land differential*. A city pricing at the floor is offering the most aggressive discount allowed by national policy; a larger positive differential indicates less aggressive competition for mobile production. Both p_{ict} and $\text{Ind_Land_Diff}_{ict}$ are winsorized at the 1st and 99th percentiles.

Treatment variable. We construct a city-level measure of fiscal exposure to the 2016 VAT revenue-sharing adjustment. The measure captures the mechanical change in a city's own-source revenue implied by replacing pre-reform tax-sharing rules with the post-reform 50:50 VAT split:

$$\text{Exposure}_c = \frac{0.5 \times \text{SAT}_{c,0} - 0.25 \times \text{VAT}_{c,0}}{\text{T}_{c,0}}, \tag{38}$$

where $\text{SAT}_{c,0}$ is city c's pre-reform business-tax revenue, $\text{VAT}_{c,0}$ is pre-reform domestic VAT revenue, and $\text{T}_{c,0}$ is general public budget revenue. The numerator has a precise accounting interpretation. Under the pre-reform regime, business tax was fully retained locally. After the 2016 adjustment, this base is shared 50:50 with the center, so the locality loses $0.5 \times \text{SAT}_{c,0}$. Simultaneously, the

local VAT share rises from 25 to 50 percent, yielding a gain of $0.25 \times \text{VAT}_{c,0}$. The difference is the net revenue loss, normalized by total budget revenue. A higher value of Exposure_c indicates a larger net fiscal loss and thus greater fiscal pressure to attract production.

We use 2011 as the base year—the last year before the B2V pilot began in Shanghai—to ensure that the exposure measure is predetermined and not contaminated by anticipatory restructuring. The identifying assumption that cross-city tax composition in 2011 is sufficiently persistent to predict composition at the time of the 2016 reform is not demanding: the industrial structure that determines local tax bases evolves slowly. As a robustness check, we also construct exposure using the 2009–2011 average of business-tax, VAT, and general budget revenue.

Controls. Parcel-level controls include land grade, lease term, and distance to the nearest city boundary. Official characteristics include tenure length of the city's party secretary and mayor. City-level macroeconomic controls comprise log GDP, log GDP per capita, secondary-industry share, tertiary-industry share, log general budget revenue, and log general budget expenditure.

Summary statistics. Table 7 reports descriptive statistics for the estimation sample. The average industrial land differential is 93 RMB/m^2, with substantial right skew: the median is only 48 RMB/m^2, and the 25th percentile is close to zero. The exposure variable has a mean close to zero with a standard deviation of 0.05, indicating meaningful cross-city variation. The median lease term is 50 years, the statutory maximum for industrial land. Approximately 11 percent of city-year observations have a party secretary at or above age 58, the de facto retirement threshold for prefecture-level officials.

6.3 Identification Strategy

The 2016 reform applied to all cities simultaneously, so there is no pure control group. Our strategy exploits cross-city variation in pre-reform fiscal composition through a continuous-treatment difference-in-differences design:

$$\text{Ind_Land_Diff}_{ict} = \beta \left(\text{Exposure}_c \times \text{Post}_t\right) + \alpha_c + \delta_t + \mathbf{X}_{ict}'\gamma + \varepsilon_{ict}, \tag{39}$$

where $\text{Post}_t = \mathbb{1}[t \geq 2016]$, α_c are city fixed effects absorbing time-invariant differences in land quality, industrial composition, and fiscal capacity, and δ_t are year fixed effects absorbing common national shocks including the aggregate effects of the B2V reform. The coefficient β is identified from the differential change in the industrial land differential after 2016 across cities with different pre-reform fiscal exposure. We report four specifications that progressively add controls: (1) city and year fixed effects only; (2) parcel-level controls and official tenure; (3) industry and leader fixed effects; and (4) city-level macroeconomic controls.

The key identifying assumption is a parallel-trends condition: absent the 2016 reform, cities with higher versus lower exposure would have followed parallel trends in the industrial land differential after conditioning on fixed effects and controls. Because exposure is constructed from 2011 fiscal composition—predetermined by at least five years—and because the reform is a national policy not targeted at particular cities, the assumption is plausible. We probe it directly with an event-study specification:

$$\text{Ind_Land_Diff}_{ict} = \sum_{k \neq -2} \beta_k \left(\text{Exposure}_c \times \mathbb{1}[t - 2016 = k]\right) + \alpha_c + \delta_t + \mathbf{X}'_{ict}\gamma + \varepsilon_{ict}, \tag{40}$$

using the year 2014 ($k = -2$) as the omitted reference period. We choose $k = -2$ rather than the immediately preceding year to guard against potential anticipatory pricing adjustments in 2015. The endpoints are binned at $k \leq -6$ and $k \geq 6$.

Standard errors are clustered at the city level, the natural level at which the treatment varies and at which persistent local factors—the stock of available parcels, the land bureau's implementation style, and local fiscal conditions—generate serial correlation in the residuals (Marianne Bertrand, Esther Duflo and Sendhil Mullainathan, 2004).

6.4 Results

6.4.1 Baseline Estimates

Table 8 reports baseline estimates of equation (39). The coefficient on $\text{Exposure}_c \times \text{Post}_t$ is negative and statistically significant in all four specifications. In the sparsest specification with only city and year fixed effects, $\hat{\beta} = -320.7$ ($p < 0.05$). Adding parcel controls and official tenure yields $\hat{\beta} = -359.4$ ($p < 0.05$). Our preferred specification, which includes industry and leader fixed effects, sharply reduces the coefficient to $\hat{\beta} = -164.7$ ($p < 0.01$), consistent with these fixed effects absorbing meaningful residual variation. Adding macroeconomic controls in column (4) further attenuates the estimate to $\hat{\beta} = -109.1$ ($p < 0.05$), but sign and significance are preserved. The economic magnitudes are substantial: a one-standard-deviation increase in fiscal exposure compresses the industrial land differential by 109–321 RMB/m^2, or roughly 9–19 percent of the sample median gap of 48 RMB/m^2.

The interpretation is straightforward and aligns directly with Proposition 6. When fiscal pressure rises—when the marginal fiscal return to hosting production increases relative to other revenue sources—more exposed cities offer meaningfully cheaper industrial land, consistent with the model's prediction that local governments use land pricing as a fiscal instrument to defend the production base that supports future tax revenue and collateral values.

6.4.2 Event-Study Evidence

Figure 5 reports event-study estimates from equation (40). The pre-2016 coefficients from $k = -6$ through $k = -1$ are individually and jointly insignificant, close to zero, and show no systematic pattern, providing no evidence of differential pre-trends. This supports the identifying assumption that high- and low-exposure cities followed parallel pricing trajectories before the reform.

The post-2016 coefficients turn negative, with the largest and most precisely estimated effects at $k = 1$ ($\hat{\beta}_1 = -228.2$, $p < 0.01$) and $k = 4$ ($\hat{\beta}_4 = -202.5$, $p < 0.10$). The discrete break at $k = 0$ is consistent with within-year phase-in: the reform was announced in April and implemented in May 2016, so the 2016 annual estimate averages pre- and post-reform months. The persistence of negative coefficients through $k = 3$ and $k = 4$ indicates a sustained change in land-pricing policy rather than a transitory adjustment.

6.5 Heterogeneity and Mechanisms

The baseline result establishes that fiscal exposure compresses industrial land prices. We now examine four dimensions of heterogeneity that map onto specific model predictions, helping distinguish the fiscal-production mechanism from broader land-market stories.

6.5.1 Party Secretary Age and Career Incentives

Table 9 splits the sample by whether the city's party secretary is below or at/above age 58, the de facto mandatory retirement threshold for prefecture-level officials. The results reveal a striking asymmetry. Among younger secretaries with active promotion incentives, the coefficient on Exposure $\times$ Post is negative and significant: -173.4 ($p < 0.01$) without macroeconomic controls and -125.5 ($p < 0.05$) with them. Among pre-retirement secretaries, the coefficient reverses sign and becomes positive and significant: $+176.3$ and $+241.8$ ($p < 0.01$ in both cases).

This sign reversal is interpretable through the lens of Proposition 7. Younger officials face promotion tournaments in which demonstrated economic performance during the current posting matters for career advancement. These incentives create a willingness to sacrifice current land-transfer revenue by pricing low in exchange for future tax-base expansion—precisely the super-additive interaction between career concerns and fiscal pressure that the proposition predicts. After 58, promotion is no longer a realistic prospect, and officials shift toward short-horizon revenue maximization, raising rather than lowering industrial land prices.

6.5.2 VAT Intensity and Statutory Rate

Table 10 splits the sample by the city's VAT contribution. The pricing response is more negative in high-VAT cities, exactly where the local fiscal return to attracting production is strongest. This

pattern is consistent with Proposition 4, which establishes that the fiscal distortion increases in the locally retained production-tax share η_v and the effective tax rate τ_v.

To sharpen this test, we reclassify industries according to their statutory VAT rate under the 2016 schedule. The 17 percent group (manufacturing and goods-producing industries) shows the clearest negative response: $\hat{\beta} = -145.5$ ($p < 0.01$) without macroeconomic controls and -108.1 ($p < 0.10$) with them. The 11 percent group (construction, real estate, and transportation) exhibits a positive coefficient ($+478.0$, $p < 0.05$ with controls), likely reflecting the compositional difference between construction-related parcels, which generate land-conveyance revenue directly, and the manufacturing parcels that dominate the industrial land sample. The 6 percent modern-services group is too small in the industrial land sample to produce precise estimates. The pattern does not support a simple monotone interpretation in which higher statutory rates always imply larger concessions; instead, it points specifically to manufacturing-oriented fiscal demand.

6.5.3 Core versus Non-Core Cities

Table 11 separates provincial capitals and sub-provincial cities (core cities) from other prefectures. The pricing response is concentrated in non-core cities ($\hat{\beta} = -155.7$, $p < 0.01$), where inter-jurisdictional competition for investment is most intense and local governments have greater scope to use land pricing strategically. Core cities show larger but imprecise point estimates. This gradient is consistent with Proposition 5: the fiscal response to production support should be strongest where land markets are less constrained and factor competition is most active.

6.5.4 Industry Factor Intensity

If the post-reform pricing response were driven by a preference for capital-deep or high-skill industrial upgrading rather than by fiscal demand for VAT revenue, the response should be stronger in industries with higher pre-reform capital or skill intensity. We test this using industry-level measures constructed from the 2011 Annual Survey of Industrial Firms. Capital intensity is measured as total assets per worker at the two-digit industry level; skill intensity is measured as wages per worker. Neither dimension generates a statistically significant triple interaction with fiscal exposure and the post-reform indicator. The triple-interaction coefficient for total assets per worker is $+0.060$ ($p = 0.370$), for fixed assets per worker $+0.115$ ($p = 0.359$), and for wages per worker $+1.149$ ($p = 0.574$). Tercile-based sample splits likewise show no clean monotone pattern. The absence of factor-intensity heterogeneity suggests that fiscally pressured cities competed for manufacturing production broadly—consistent with fiscal demand for any production that generates VAT revenue under the new sharing rule, rather than selective industrial upgrading. Full results are reported in Appendix A.

6.6 Robustness

Two additional exercises address potential concerns about timing and measurement. First, the event-study coefficients reported in Table 12 confirm that the pre-reform coefficients are mixed and statistically imprecise, inconsistent with a systematic pre-trend among fiscally exposed cities. The post-reform coefficients are predominantly negative, with the clearest significant decline in the first year after the shock, consistent with a discrete repricing rather than a smooth pre-existing divergence.

Second, Table 13 replaces the baseline exposure measure with an alternative constructed from the 2009–2011 average of business-tax, VAT, and general budget revenue. The results are qualitatively and quantitatively similar: the coefficient remains negative in every specification and statistically significant in the richer columns ($\hat{\beta} = -102.3$, $p < 0.05$ in the fullest specification, compared to -109.1 in the baseline). The combination of timing evidence and robustness to alternative measurement strengthens the causal interpretation.

Taken together, the reduced-form evidence in this section supports the central mechanism of the paper through an empirical strategy independent of the structural model. When fiscal pressure intensifies—as it did differentially across cities after the 2016 reform—local governments compress industrial land prices to attract the manufacturing tax base that the origin-based fiscal architecture makes most valuable. The response is stronger where career incentives are active, where the local VAT stake is larger, and where inter-jurisdictional competition is most intense. These patterns align closely with the model's predictions and corroborate the structural finding that fiscal incentives, rather than political tournaments alone, increasingly drive local production bias.

7 Conclusion

This paper asks why Chinese local governments so often favor producers over residents. Our answer is that China's fiscal architecture creates a local production bias. Under origin-based tax assignment, local governments retain a stronger fiscal claim on production than on household demand, so production-oriented support relaxes local budget constraints more directly than welfare provision. Welfare spending can still raise local revenue through migration and rent capitalization, but those channels are weaker and slower than the direct fiscal return to production. The core distortion is therefore not simply fiscal scarcity; it is a distorted ranking of local fiscal returns.

We show this through both structural and reduced-form evidence. In the structural decomposition, based on data from 283 prefectures over 1998–2019, the source of local investment distortions shifts from political tournament incentives before 2009 toward fiscal pressure after the major tax reforms; by the post-2016 period, the fiscal wedge accounts for 80% of infrastructure-investment variation, while the political wedge falls to 15% of its earlier peak. In reduced form, the 2016 Business Tax-to-value-added tax reform provides a natural experiment: cities with greater fiscal

exposure compressed industrial land prices more aggressively, especially where officials still faced promotion incentives and where local value-added tax stakes were largest. Taken together, these results indicate that political incentives still matter, but they matter increasingly through interaction with a fiscal system that rewards production more than welfare.

The broader macro implications follow directly. When many localities face the same incentive gradient, their collective production bias suppresses household demand, sustains leverage, and contributes to external imbalance. In the calibrated economy, private consumption is 36.0% of GDP under the origin-based regime and rises to 40.2% under the destination-based reform, while net exports fall from 19.2% to 15.8% and local government debt falls from 31.2% to 26.7% of GDP. By contrast, additional transfers deliver larger immediate welfare gains but do not materially change expenditure composition because they leave the marginal fiscal ranking unchanged. The policy lesson is therefore straightforward: rebalancing requires changing what local governments are rewarded for, not only giving them more resources. A durable shift toward household demand requires a fiscal system in which local governments earn returns from residents as well as from producers.

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Figures and Tables

Figure 1: Institutional Context and Empirical Facts

Notes: Panel (a) illustrates the three institutional regimes underlying local production bias in China: the pre-2009 tournament era under the old VAT treatment of capital purchases, the 2009–2015 transition with LGFV expansion and land-finance amplification, and the post-2016 fiscal-survival period following B2V. Panel (b) plots key fiscal variables from the China City Statistical Yearbook (300 cities, 1998–2019). Fixed-asset investment (FAI/GDP) steadily rises, land revenue (real-estate/GDP) expands sharply from 2005, while VAT/GDP peaks before 2010 and declines post-B2V. Vertical lines mark the 2009 and 2016 reforms.

Figure 2: The Fiscal Wedge Mechanism and the Consumption-Tax Policy Frontier

Notes: Panel (a) plots the marginal fiscal return on infrastructure (MFRI) and welfare (MFRW) as functions of public capital. The MFRI exceeds MFRW under origin-based taxation because infrastructure expands retained production-based VAT and land revenue; a destination-based reform ($\eta_c = 0.50$) raises MFRW substantially. Panel (b) traces equilibrium outcomes as the locally retained consumption-tax parameter η_c increases from 0 to 0.50. Higher η_c raises the private consumption share (C/Y), reduces infrastructure investment (I^G/Y), and improves industrial capacity utilisation. The vertical dotted line marks the baseline calibration.

Figure 3: Institutional Wedge Decomposition: Evolution, Parameters, and Variance Attribution

Notes: Panel (a) plots real-time shares of investment variation attributed to fiscal and political wedges. The fiscal wedge rises from 38% (pre-2009) to 78% (post-2016); the political wedge falls from 55% to 15%. Panel (b) shows the same decomposition as a stacked area. Panel (c) plots the evolution of the career-incentive intensity parameter κ and the budget-discipline parameter μ across regimes; κ declines as tournaments weaken, and μ falls below 1 as budget constraints soften. Panel (d) decomposes the variance of infrastructure investment over 2008–2019: land revenue (40.3%) and VAT/TFP shocks (31.3%) together account for 71.6% of the variance; career concerns contribute 21.2%.

Figure 4: Policy Counterfactuals: Transition Paths and Consumption Channel Decomposition

Notes: Panel (a) shows the simulated transition path of the private consumption share of GDP under the baseline and two counterfactual scenarios over a 20-year horizon. Transfers raise consumption by 1.4 pp; tax reform raises it by 4.1 pp. Dashed lines show the OECD average (55%) and middle-income economy average (45%). Panel (b) decomposes the consumption response by channel. Transfers generate a modest but broad-based increase, while tax reform raises consumption primarily through lower saving and reduced balance-sheet pressure ("Lower Saving") and general-equilibrium reallocation ("GE").

Table 1: Calibration and Model Fit

Panel A: Externally Calibrated Parameters			
Symbol	Description	Value	Source
β	Discount factor	0.98	Standard annual calibration
α	Private capital share	0.38	Input-output discipline
γ	Infrastructure elasticity	0.05	Output response to public capital
A_T/A_N	Tradeable vs. non-tradeable productivity	1.08	Two-sector baseline
η_v	Local VAT retention	0.50	Post-2016 shared VAT rule
η_c	Local service-tax retention	0.18	Service-side fiscal return
τ_v	VAT rate	0.17	Fiscal accounts
τ_c	Service tax rate	0.10	Fiscal accounts
Panel B: Internally Disciplined Parameters			
Symbol	Description	Value	Target Moment
ρ	Welfare-consumption complementarity	-1.25	Public-service demand elasticity
ξ	Land-finance elasticity	0.50	Residential land feedback
λ_ℓ	Land capture share	0.68	Local land monetisation
ε_L	Migration elasticity	0.80	Partially mobile labour
$\bar{H}$	Residential land supply	0.55	Housing-market closure
κ	Career incentive intensity	0.32	Promotion-tournament wedge
μ	Budget-discipline parameter	0.80	Debt rollover discipline
Panel C: Internal Targets and Calibration Match			
Target	Statistic	Data / Institutional	Model
Public-service demand	Welfare elasticity	-1.25	-1.25
Land-finance feedback	Residential land elasticity	0.50	0.50
Land monetisation	Land capture share	0.68	0.68
Population response	Migration elasticity	0.80	0.80
Housing closure	Residential land supply	0.55	0.55
Career incentives	Promotion-tournament wedge	0.32	0.32
Debt discipline	Budget rollover parameter	0.80	0.80

Notes: Panel A reports parameters set from external sources or institutional rules. Panel B reports the seven parameters disciplined internally by the model together with the empirical or institutional targets used to pin them down. Panel C reports the corresponding seven target values and their model counterparts. For targets expressed directly as elasticities or institutional shares, the model counterpart equals the calibrated value by construction.

Table 2: Infrastructure Bias and Capacity Outcomes Across Institutional Configurations

Configuration	I^G/Y	S/Y	C/Y	D/Y	Util.
Social Planner	8.0	33.8	37.1	0.0	88.1
Fiscal Only	3.6	16.4	37.4	0.6	81.6
Fiscal + Career	43.9	2.0	31.2	0.0	77.0
Fiscal + Debt	7.3	16.5	36.0	34.6	80.9
Full Amplification	13.5	11.4	33.9	37.9	78.1

Notes: This table reports steady-state outcomes for five variants of the model. The social planner case abstracts from fiscal distortions and borrowing. "Fiscal Only" keeps the fiscal wedge but shuts down career incentives and debt. "Fiscal + Career" restores promotion incentives without debt, "Fiscal + Debt" restores leverage with weak career pressure, and "Full Amplification" combines the fiscal wedge with both career and debt channels.

Table 3: Institutional Accounting Parameters Across Reform Regimes

Period	Reform channel	η_v	η_c	ξ	κ	μ
1998–2008	Pre-2009 VAT regime	0.16	0.00	0.05	1.22	3.56
2009–2015	2009 VAT reform and LGFV expansion	0.25	0.00	0.85	0.47	1.06
2016–2019	2016 B2V shared-VAT regime	0.50	0.18	0.50	0.32	0.80

Notes: η_v captures the locally retained production-side VAT base, η_c the locally retained service-side or consumption-side tax base, ξ the strength of land-finance feedback, κ the intensity of political tournament incentives, and ζ the hardness of the local budget constraint. The reform-channel column summarizes how the 2009 VAT reform and the 2016 B2V reform re-ranked the activities that local governments most wanted to support. The BCA wedge identification uses the following auxiliary parameters: elasticity of investment to VAT revenue $\eta^{\text{inv}}_{\text{VAT}} = 0.42$ (Corr = 0.58), to land revenue $\eta^{\text{inv}}_{\text{Land}} = 0.38$ (Corr = 0.62), to LGFV spread $\eta^{\text{inv}}_{\text{Spread}} = -0.25$, and to LGFV issuance $\eta^{\text{inv}}_{\text{Credit}} = 0.31$ (Corr = 0.55). Wedge persistence: $\rho_{\Theta^F} = 0.85$, $\rho_{\Theta^K} = 0.78$, $\rho_{\Theta^P} = 0.65$.

Table 4: Wedge Decomposition: Regime Shares and Variance Attribution

Panel A: Wedge Shares by Reform Regime

Period	Political (%)	Fiscal (%)	Residual (%)
1998–2008	54.9	38.1	7.0
2009–2015	24.3	68.9	6.8
2016–2019	14.6	78.4	7.0

Panel B: Variance Decomposition (2008–2019)

Component	Share of Variance (%)
Land revenue shocks	40.3
VAT & TFP shocks	31.3
Career concerns	21.2
Residual	7.2
Fiscal determinism total	71.6

Notes: Panel A reports the share of infrastructure-investment variation attributed to fiscal and political wedges across three reform regimes. The fiscal wedge incorporates both the direct tax-base channel and the indirect land-collateral channel. Panel B decomposes the variance of infrastructure investment over 2008–2019: land revenue and VAT/TFP shocks sum to fiscal determinants (71.6%).

Table 5: Descriptive Facts Across Reform Windows

Metric	1998-2008	2009-2015	2016-2019
VAT / GDP (%)	4.0	4.8	3.0
FAI / GDP (%)	36.1	64.1	72.9
Real estate / GDP (%)	7.1	12.2	13.2
Retail / GDP (%)	34.0	36.7	41.9
Education / GDP (%)	1.5	2.5	2.8
Budget revenue / GDP (%)	5.9	8.9	9.4

Notes: These descriptive moments are computed directly from the reform-window data pipeline. The post-2009 window captures the expansion of infrastructure investment and of land finance following the VAT input-credit reform and the stimulus period; the post-2016 window captures the service-side tax-base shift caused by B2V.

Table 6: Policy Counterfactuals: Outcomes and Consumption Decomposition

Panel A: Equilibrium Outcomes

Metric	Baseline	Transfers	Tax Reform
I^G/Y (%)	7.4	8.4	6.6
S/Y (%)	16.3	20.2	16.3
C/Y (%)	36.0	37.4	40.2
D/Y (%)	31.2	29.6	26.7
Capacity util. (%)	80.9	82.7	84.4
ECV (%)	0.0	3.49	0.19

Panel B: Consumption Decomposition

Channel	Transfers (pp)	Tax Reform (pp)
Income effect	0.2	0.0
Welfare–C complementarity	0.5	0.0
Saving / deleveraging	0.5	3.1
General equilibrium	0.2	1.0
Total $\Delta C/Y$	1.4	4.1

Notes: Panel A compares equilibrium outcomes under the baseline (2016–2019), increased transfers (Counterfactual A), and destination-based tax reform (Counterfactual B). Panel B decomposes the change in the private consumption share of GDP under each counterfactual. Transfers generate a modest increase spread across several channels; tax reassignment raises consumption primarily through lower saving, reduced balance-sheet pressure, and general equilibrium reallocation.

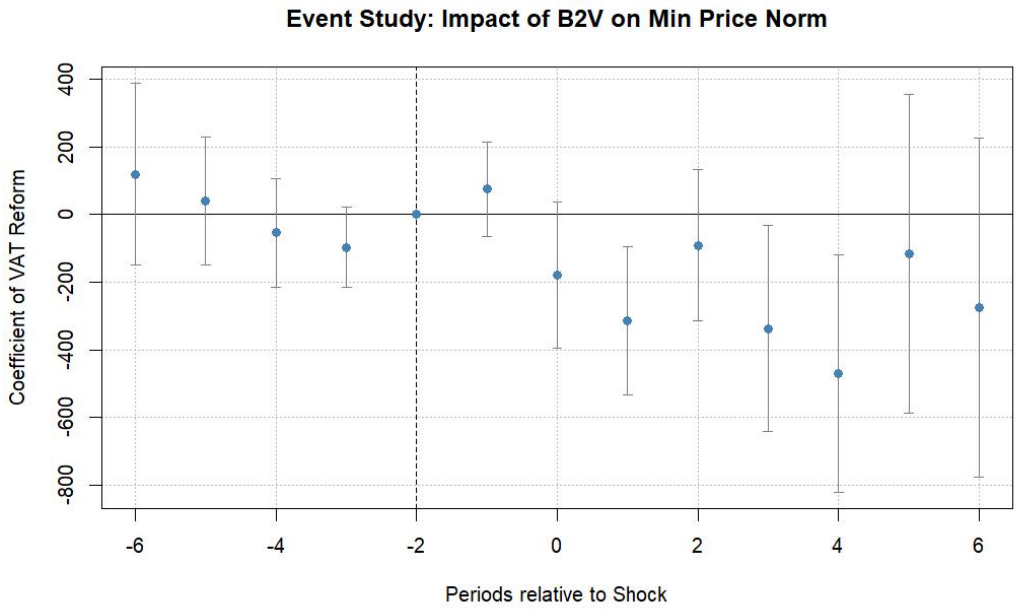


Figure 5: Event-Study Estimates: Fiscal Exposure and Industrial Land Pricing

Notes: This figure plots the coefficients $\hat{\beta}_k$ from equation (40), estimating the interaction of city-level fiscal exposure with relative-year indicators. The omitted reference period is $k = -2$ (year 2014). Endpoints are binned at $k \leq -6$ and $k \geq 6$. Vertical bars are 95% confidence intervals based on city-clustered standard errors. Negative coefficients indicate deeper post-reform industrial land discounts in more fiscally exposed cities. The plotted specification corresponds to the tabulated estimates in Table 12.

Table 7: Summary Statistics: Industrial Land Transactions

	N	Mean	SD	P25	P50	P75
Panel A: Dependent Variable and Treatment						
Ind. Land Premium (RMB/m^2)	546,545	93.13	170.44	0.72	48.00	140.01
Unit Price (RMB/m^2)	546,545	251.59	191.47	127.27	201.76	315.00
Exposure	518,414	−0.01	0.05	−0.03	−0.01	0.03
Panel B: Parcel Characteristics						
Lease Term (years)	544,298	48.83	5.64	50	50	50
Land Grade	470,866	6.33	4.39	3	5	11
Dist. to City Border (km)	546,545	15.81	13.41	6.41	12.72	21.50
Panel C: Official Characteristics						
Secretary Tenure (years)	546,545	1.45	1.44	0	1	2
Mayor Tenure (years)	546,545	1.37	1.35	0	1	2
Pre-Retire (age $\geq$ 58)	546,545	0.11	0.31	0	0	0
Panel D: City-Level Macro Controls						
ln(GDP)	495,648	7.79	0.90	7.16	7.81	8.41
ln(GDP per capita)	495,030	10.83	0.63	10.41	10.85	11.27
Secondary Ind. Share (%)	495,181	47.38	9.12	41.54	47.77	53.06
Tertiary Ind. Share (%)	494,636	42.24	8.99	36.02	42.12	48.41
ln(Budget Revenue)	521,521	14.40	1.04	13.72	14.39	15.13
ln(Budget Expenditure)	521,521	15.10	0.78	14.59	15.13	15.63

Notes: This table reports summary statistics for the parcel-level land-transaction sample and the matched city-year covariates used in Section 6. Panel A reports the dependent variable and treatment measure, Panel B parcel characteristics, Panel C official characteristics, and Panel D city-level macro controls. Monetary variables are measured in RMB, and quartiles are computed within the available estimation sample for each variable.

Table 8: Fiscal Exposure and Industrial Land Pricing: Baseline Results

	(1) No Ctrl	(2) FEs	(3) Baseline	(4) City Control
Exposure × Post	−320.7**	−359.4**	−164.7***	−109.1**
	(149.7)	(161.9)	(52.26)	(52.13)
City FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	No	No	Yes	Yes
Leader FE	No	No	Yes	Yes
Parcel controls	No	Yes	Yes	Yes
City controls	No	No	No	Yes
Observations	518,413	448,119	448,115	422,978
R^2	0.427	0.450	0.529	0.530

Notes: The dependent variable is the industrial land differential (equation 37) in RMB per square meter. Exposure × Post is the interaction of the city-level fiscal exposure from equation (38) with a post-2016 indicator. Columns progressively add parcel controls (land grade, lease term, distance to city boundary), industry and leader fixed effects, and city-level macroeconomic controls. Standard errors clustered by city are in parentheses. *, **, and *** denote significance at the 10, 5, and 1 percent levels.

Table 9: Heterogeneity by Party Secretary Age

	(1) Age < 58	(2) Age ≥ 58	(3) Age < 58	(4) Age ≥ 58
Exposure $\times$ Post	-173.4^{***}	176.3^{***}	-125.5^{**}	241.8^{***}
	(53.11)	(42.08)	(54.77)	(73.66)
City FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Leader FE	Yes	Yes	Yes	Yes
Parcel controls	Yes	Yes	Yes	Yes
City controls	No	No	Yes	Yes
Observations	400,208	47,901	376,833	46,139
R^2	0.535	0.484	0.537	0.487

Notes: This table splits the baseline specification by whether the city's party secretary is below age 58 (columns 1 and 3) or at least age 58 (columns 2 and 4). All columns include city, year, industry, and leader fixed effects together with parcel controls; columns (3) and (4) additionally include city-level macroeconomic controls. Standard errors clustered by city are in parentheses. *, **, and *** denote significance at the 10, 5, and 1 percent levels.

Table 10: Heterogeneity by VAT Contribution

	(1) Normal VAT	(2) High VAT	(3) Normal VAT	(4) High VAT
Exposure × Post	−161.2**	−216.6***	−103.3	−159.2***
	(65.73)	(58.53)	(67.22)	(60.17)
City FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Leader FE	Yes	Yes	Yes	Yes
Parcel controls	Yes	Yes	Yes	Yes
City controls	No	No	Yes	Yes
Observations	303,956	144,125	287,332	135,611
R^2	0.514	0.580	0.515	0.585

Notes: This table splits the baseline specification by cities with normal versus high VAT contribution intensity. All columns include city, year, industry, and leader fixed effects together with parcel controls; columns (3) and (4) additionally include city-level macroeconomic controls. Standard errors clustered by city are in parentheses. *, **, and *** denote significance at the 10, 5, and 1 percent levels.

Table 11: Heterogeneity by Core-City Status

	(1) Non-Core	(2) Core City	(3) Non-Core	(4) Core City
Exposure × Post	−155.7***	−287.1	−92.09*	−296.7
	(51.41)	(457.0)	(48.21)	(479.1)
City FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Leader FE	Yes	Yes	Yes	Yes
Parcel controls	Yes	Yes	Yes	Yes
City controls	No	No	Yes	Yes
Observations	372,778	75,335	351,034	71,943
R^2	0.536	0.521	0.538	0.521

Notes: Columns 1 and 3 restrict to non-core cities; columns 2 and 4 restrict to provincial capitals and sub-provincial cities (core cities). All columns include city, year, industry, and leader fixed effects together with parcel controls; columns (3) and (4) additionally include city-level macroeconomic controls. Standard errors clustered by city are in parentheses. *, **, and *** denote significance at the 10, 5, and 1 percent levels.

Table 12: Event Study Coefficients (Tabulated)

Relative Year k	$\hat{\beta}_k$
$k \leq -6$	83.48
	(115.2)
$k = -5$	68.39
	(85.44)
$k = -4$	−29.77
	(67.72)
$k = -3$	−76.88
	(53.02)
$k = -2$	[Reference]
$k = -1$	70.53
	(60.38)
$k = 0$	−98.29
	(69.97)
$k = 1$	−228.2***
	(84.94)
$k = 2$	−16.40
	(85.42)
$k = 3$	−147.9
	(95.60)
$k = 4$	−202.5*
	(122.0)
$k = 5$	77.48
	(196.3)
$k \geq 6$	−44.06
	(220.3)
Observations	448,115
R^2	0.529

Notes: This table reports the dynamic event-study coefficients from equation (40). The omitted reference period is $k = -2$ (year 2014). The specification includes city, year, industry, and leader fixed effects together with parcel controls. Standard errors clustered by city are in parentheses. *, **, and *** denote significance at the 10, 5, and 1 percent levels.

Table 13: Robustness: Alternative Exposure Measure (2009–2011 Average)

	(1) No Ctrl	(2) FEs	(3) Baseline	(4) City Control
Exposure (alt.) × Post	−280.9*	−306.3*	−154.8***	−102.3**
	(145.7)	(161.1)	(49.14)	(48.58)
City FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	No	No	Yes	Yes
Leader FE	No	No	Yes	Yes
Parcel controls	No	Yes	Yes	Yes
City controls	No	No	No	Yes
Observations	481,178	415,699	415,696	392,334
R^2	0.428	0.451	0.531	0.533

Notes: The exposure measure is constructed using the 2009–2011 average of business-tax revenue, VAT revenue, and general public budget revenue, replacing the single-year 2011 measure used in the baseline. The specification sequence mirrors the baseline by progressively adding parcel controls, industry and leader fixed effects, and city-level macroeconomic controls. Standard errors clustered by city are in parentheses. *, **, and *** denote significance at the 10, 5, and 1 percent levels.

A Industry Factor-Intensity Heterogeneity

This appendix reports supplementary results on whether the post-reform industrial land pricing response varies with industry capital intensity or skill intensity. As discussed in Section 6.5, neither dimension generates a statistically significant triple interaction, suggesting that the fiscal response reflects demand for manufacturing tax base broadly rather than selective industrial upgrading.

Table 14: Industry Heterogeneity by Capital Intensity

Dependent Variable:	Ind_Land_Diff			
Model:	(1)	(2)	(3)	(4)
Variables				
Exposure × Post × Asset/Worker	0.0604	0.0642		
	(0.0674)	(0.0727)		
Exposure × Post × Fixed Asset/Worker			0.1147	0.1194
			(0.1247)	(0.1339)
Spec	Asset/worker	Asset/worker	Fixed asset/worker	Fixed asset/worker
Industry FE	No	No	No	No
City FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Leader FE	Yes	Yes	Yes	Yes
Parcel controls	Yes	Yes	Yes	Yes
Macro controls	No	Yes	No	Yes
Fit statistics				
Observations	326,060	308,075	326,060	308,075
R^2	0.55222	0.55455	0.55224	0.55457

Clustered (city) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Notes: Capital intensity is measured at the two-digit industry level from the 2011 Annual Survey of Industrial Firms. Columns 1–2 use total assets per worker; columns 3–4 use fixed assets per worker. The triple-interaction coefficient captures whether the post-reform pricing response varies with industry capital intensity.

Table 15: Capital Intensity: Tercile Split

Dependent Variable:	Ind_Land_Diff			
Model:	(1)	(2)	(3)	(4)
Variables				
Exposure × Post	-129.7	-180.7	-83.56	-143.4
	(81.90)	(117.0)	(101.4)	(86.89)
Subsample	Bottom tercile	Top tercile	Bottom tercile	Top tercile
Industry FE	No	No	No	No
City FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Leader FE	Yes	Yes	Yes	Yes
Parcel controls	Yes	Yes	Yes	Yes
Macro controls	No	No	Yes	Yes
Fit statistics				
Observations	133,795	56,660	126,595	53,505
R^2	0.56369	0.56605	0.56463	0.56743

Clustered (city) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Notes: Industries are split into terciles of capital intensity (total assets per worker) from the 2011 Annual Survey of Industrial Firms. Columns 1 and 3 restrict to the bottom tercile; columns 2 and 4 restrict to the top tercile.

Table 16: Industry Heterogeneity by Skill Intensity

Dependent Variable:	Ind_Land_Diff	
Model:	(1)	(2)
Variables		
Exposure × Post × Wage/Worker	1.149	1.420
	(2.040)	(2.210)
Spec	Wage/worker	Wage/worker
Industry FE	No	No
City FE	Yes	Yes
Year FE	Yes	Yes
Leader FE	Yes	Yes
Parcel controls	Yes	Yes
Macro controls	No	Yes
Fit statistics		
Observations	326,060	308,075
R^2	0.55238	0.55472

Clustered (city) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Notes: Skill intensity is measured as total wages per worker at the two-digit industry level from the 2011 Annual Survey of Industrial Firms. The triple-interaction coefficient captures whether the post-reform pricing response varies with industry skill intensity.

Table 17: Skill Intensity: Tercile Split

Dependent Variable:	Ind_Land_Diff			
Model:	(1)	(2)	(3)	(4)
Variables				
Exposure × Post	-282.6**	-192.3*	-222.9	-175.7
	(126.1)	(104.8)	(141.0)	(112.1)
Subsample	Bottom tercile	Top tercile	Bottom tercile	Top tercile
Industry FE	No	No	No	No
City FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Leader FE	Yes	Yes	Yes	Yes
Parcel controls	Yes	Yes	Yes	Yes
Macro controls	No	No	Yes	Yes
Fit statistics				
Observations	126,046	51,445	119,497	48,385
R^2	0.55783	0.58568	0.55837	0.59127

Clustered (city) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Notes: Industries are split into terciles of skill intensity (wages per worker) from the 2011 Annual Survey of Industrial Firms. Columns 1 and 3 restrict to the bottom tercile; columns 2 and 4 restrict to the top tercile.