The Fiscal-Property Nexus: How Local Government Finance Shapes Housing Market Resilience During China's Real Estate Downturn

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ABSTRACT

This paper examines the spatial heterogeneity in housing price resilience across over 300 Chinese cities during an unprecedented real estate market correction beginning in late 2021. Drawing on fiscal geography perspectives, the study analyzes the fiscal-property resilience nexus to understand how local government fiscal structures shape housing market outcomes. Using panel regression models with fixed effects from 2015-2024, the analysis reveals three significant findings.First, the research identifies a distinctive "barbell effect" in housing price resilience across China's urban hierarchy, with both Tier 1 and Tier 4+ cities demonstrating greater price stability than mid-tier cities. Second, different fiscal instruments operate through distinct phase-dependent mechanisms: General bonds transform from statistically insignificant factors during booms to critical 'crisis stabilizers' during market corrections, actively anchoring price expectations when private liquidity retreats. Conversely, LGFV debt shifts from a dormant factor to a binding fiscal constraint, exerting a significant drag on housing prices only during the downturn. Third, the analysis of regional and tier-specific effects reveals that Tier 1 cities demonstrate a unique 'hyper-sensitivity' to explicit government credit, distinguishing their resilience source from the subsidy-driven stability of lower-tier cities. The granular decomposition of local government fiscal indicators reveals heterogeneous effects of different debt types on housing price resilience across regions and urban hierarchies, with fiscal instruments' effects concentrating in Eastern regions with developed institutions and binding supply constraints. These insights contribute to broader debates on the spatially variegated nature of state-market relations in urban governance through China's distinctive fiscal-property nexus.

Keywords: Fiscal geography; Housing price resilience; Local government debt; Land finance; Housing Financialization; Market correction

1. Introduction

Since late 2021, China's real estate market has entered an unprecedented adjustment phase. Official data from 70 major cities shows second-hand housing prices have declined by an average of 15% nationwide—the most severe and sustained correction since systematic data collection began. This national decline, however, masks a remarkable spatial differentiation in market performance. Rather than following traditional urban hierarchy or regional development gradients, housing price resilience presents a complex, non-linear pattern wherein some economically weaker cities demonstrate remarkable stability while certain developed regions experience dramatic corrections.

This spatial heterogeneity in housing price resilience demands systematic analysis through the lens of China's unique institutional environment. While conventional housing market theories emphasize demand-side factors such as population mobility, economic growth, and amenity values (Glaeser and Gyourko 2005; Roback 1982), China's distinctive "government-market" relationship generates more complex response mechanisms (Feng, Wu, and Zhang 2023). Local governments deeply participate in real estate market regulation through multiple channels including land transfers, urban renewal, and infrastructure investment, and have actively responded to the central government's policy directive to "implement city-specific measures and stabilize the market" during the recent market downturn. Although all local governments are committed to stabilizing housing prices, their actual intervention capabilities and strategic choices exhibit significant differences.

Drawing on fiscal geography perspectives (Tapp and Kay 2019), we examine the "fiscal-property resilience nexus" across China's diverse urban landscape. This analysis explores how local governments' fiscal structures fundamentally shape their capacity, incentives, and strategic responses to market downturns, generating distinct spatial patterns of housing market outcomes. Within this fiscal-property resilience nexus, we identify three key mechanisms through which fiscal structures influence market stability:

First, land transfer revenue dependency may exhibit a dual impact on housing price resilience. High land finance dependency suggests local governments have stronger motivation to support housing prices (Chang, Wang, and Xiong 2025), but simultaneously reflects structural economic vulnerabilities including limited industrial diversification and weak tax bases. In market downturns, these structural weaknesses might override governments' supportive capacity, potentially accelerating price declines. Second, different types of local government debt may have varying effects across market phases. During boom periods, higher debt levels may enable cities to undertake large-scale infrastructure investments, enhancing urban attractiveness (Ambrose, Deng, and Wu 2015); however, in downward cycles, excessive debt burdens might transform into fiscal pressure, compelling local governments to reduce public services and investments (Li, Wu, and Zhang 2023). The composition of debt potentially matters significantly—explicit debt (general bonds and special-purpose bonds) and implicit debt (through Local Government Financing Vehicles, LGFVs) may affect housing prices through distinct pathways.

Third, we hypothesize that the relationship between fiscal conditions and land supply may transform across different market phases. Land supply, as an important policy tool for local governments, may play different roles throughout the market cycle. During boom periods, local governments might tend to use land supply as a price maintenance tool, strategically controlling supply to support land and housing prices (Pan et al. 2017); while in adjustment periods, land supply might transform into a fiscal pressure transmission channel, with local governments potentially facing a dilemma between fiscal revenue needs and market stabilization.

Using a comprehensive dataset covering over 300 Chinese cities from 2016 to 2024 and employing

panel regression models with fixed effects, we address three core questions: (1) What are the spatial-temporal characteristics of China's real estate market correction? (2) How do local government fiscal conditions, debt structures, and land finance dependency affect urban housing price resilience? (3) What role does land supply play in mediating the relationship between local government finances and the real estate market, and has this function transformed between market expansion and contraction phases?

Our empirical analysis yields several significant findings. First, we identify a distinctive "barbell effect" in housing price resilience across China's urban hierarchy, with both Tier 1 and Tier 4+ cities demonstrating greater price stability than mid-tier cities. Second, we reveal that fiscal instruments undergo a fundamental functional transformation. Contrary to the view that explicit debt consistently supports growth, we find that general bonds act specifically as a counter-cyclical stabilizer—their positive impact on housing prices 'awakens' only during the adjustment phase. In contrast, implicit debt (LGFV) does not fuel growth during booms but transforms into a severe 'fiscal burden' during corrections, significantly depressing prices in cities with high leverage. Third, our heterogeneity analysis explains the barbell effect: Tier 1 cities exhibit an outsized sensitivity to explicit state backing (both general and special bonds), while bottom-tier cities rely on fiscal transfer-like effects, leaving middle-tier cities in a 'valley of ineffectiveness' where implicit debt burdens dominate.

This research contributes to existing literature by introducing a granular decomposition of local government fiscal indicators that reveals distinct impact pathways of different debt types on housing markets. Unlike previous studies that largely treat local government debt as homogeneous (Chang, Wang, and Xiong 2025; Pan et al. 2017), we distinguish between general bonds, special-purpose bonds, and LGFV debt, identifying their heterogeneous effects on housing price resilience. Our analysis of land supply as a mediating mechanism further illuminates how local governments strategically deploy land resources to achieve fiscal and market objectives across different market phases, extending understanding of land's role in fiscal-property relations beyond its direct revenue-generating function (He et al. 2022; Wu, Gyourko, and Deng 2015).

This comprehensive investigation provides new theoretical perspectives for understanding China's real estate market spatial differentiation and offers empirical evidence for formulating differentiated policy interventions. By revealing how local fiscal structures shape housing price resilience during market downturns, our findings suggest that addressing housing market instability requires tailored approaches that account for specific local fiscal conditions rather than uniform national policies. In broader terms, this research contributes an analytical framework for understanding non-equilibrium adjustments in global real estate markets in the post-pandemic era, with implications that extend beyond China's specific context to inform debates on the fiscal-property nexus in urban governance. The rest of the paper is structured as follows. Section 2 reviews the literature on fiscal geography and China's fiscal-property nexus. Section 3 presents our research methodology and data sources. Section 4 examines the spatial-temporal characteristics of China's housing market correction. Section 5 analyzes how fiscal structures affect housing price resilience across different market phases, regions, and urban hierarchies. Section 6 examines the functional transformation of land supply as a mediating mechanism. Section 7 concludes with policy implications and directions for future research.

2. Fiscal Geography and Housing Markets in China

2.1 Fiscal Geography and Urban Fiscal Crisis

Fiscal geography examines how government fiscal systems shape urban development patterns across space. According to Tapp and Kay (2019), fiscal geography emphasizes how state actors influence market processes through tax systems and budgetary mechanisms. Unlike financial geography, which primarily examines private capital flows, fiscal geography centers on how government fiscal activities proactively shape differentiated patterns of urban growth and governance.

The relationship between fiscal constraints and urban development has been extensively studied in contexts of fiscal crises. O'Connor (1973) identified the inherent contradictions in modern states simultaneously satisfying accumulation and legitimation demands. This dual imperative creates structural fiscal strain as cities must absorb increasing costs of economic development while private interests appropriate the resulting surplus (Friedland, Piven, and Alford 1977).

Local governments implement diverse strategies in response to fiscal crises. Kirkpatrick and Smith (2011) found that as federal interventions decreased, local governments increasingly depended on "backdoor" financing mechanisms. Weber (2010) demonstrated through her analysis of Chicago's Tax Increment Financing that even fiscally "successful" interventions can produce spatial inequality, accelerating gentrification in targeted areas while leaving other neighborhoods without comparable investment.

The theoretical contribution of fiscal geography lies in revealing that fiscal instruments are not merely means of government operation but key mechanisms shaping spatial development. Fiscal deterioration significantly reconfigures local governments' intervention capacity in markets while creating spatially differentiated patterns of response (Davidson and Ward 2022). This framework provides a crucial foundation for examining heterogeneity in housing price resilience during market corrections.

2.2 China's Fiscal-Property Nexus

Since the 1994 tax reforms, a distinctive symbiotic relationship has formed between local government finances and real estate markets in China. This fiscal-property nexus is characterized by land finance and LGFVs as core revenue sources, creating a unique model of urban governance (Ambrose, Deng, and Wu 2015).

2.2.1 The Evolution of Local Government Debt Instruments

Local governments in China utilize three primary debt instruments with distinct characteristics and impacts on housing markets. General bonds finance non-profit public welfare projects and are repaid through fiscal revenues. Special-purpose bonds target projects with explicit income streams and are primarily repaid through project revenues rather than general budgets. LGFV bonds, issued by Local Government Financing Vehicles, represents implicit debt that relies on land collateral and often carries higher interest rates and greater risk (Li, Wu, and Zhang 2023).

These instruments operate within China's unique budgetary constraints system. As Li, Wu, and Zhang (2023) explain, the central government has incorporated local government bonds into the budgetary process since 2015 to restrict local government debt and manage financial risk. This budgetary process makes bond issuance subject to both horizontal supervision from finance departments and vertical

intervention from the Ministry of Finance, constraining local governments' ability to borrow excessively as they previously did through financing platforms.

The relationship between these fiscal instruments and housing markets is phase-dependent. During market expansion periods, local governments control land supply to drive up land prices, securing adequate fiscal resources. Pan et al. (2017) found that urban investment bonds reached 49.74% of GDP by 2015, while Huang and Du (2017) discovered that financing platforms showed greater land bidding activity under fiscal pressure. This formed a self-reinforcing cycle where high land prices supported land-based financing, further driving infrastructure investment and land appreciation.

2.2.2 Theoretical Framework: Housing Prices and Local Government Fiscal Behavior

The bidirectional relationship between housing prices and local government fiscal behavior forms a critical theoretical foundation for understanding spatial heterogeneity in housing market resilience. This section develops a framework explaining how housing price declines trigger specific local government responses through various fiscal instruments, and how these interventions subsequently affect housing markets.

Housing Prices as Fiscal Resource Generator

Housing prices are of paramount importance to Chinese government finances, but through mechanisms distinctly different from those observed in Western developed countries. While Western governments primarily rely on recurring property taxes for stable revenue generation (Beramendi & Rueda, 2007), China's fiscal relationship with real estate markets follows a fundamentally different model. Under China's land ownership system where all urban land is state-owned, local governments act as both market regulators and market participants by controlling land supply and capturing value through land auctions. This creates a direct fiscal incentive for local governments to maintain elevated housing prices, as higher land values translate into greater revenues from land transfers (Ansell, 2019; Lutz, 2008).

When housing prices decline, local governments face immediate fiscal pressure through multiple channels. First, falling prices and lower sale numbers directly reduce land transfer revenues through a price and a volume effect, compromising a key discretionary funding source. Second, declining property values undermine the land-based collateral that supports LGFV financing, potentially triggering debt service difficulties. Third, reduced development activity diminishes construction-related tax revenues, further straining fiscal resources (Chen et al. (2023)). These mechanisms create strong incentives for local governments to intervene when housing markets weaken.

Local Government Response Mechanisms

Local governments deploy three primary fiscal instruments in response to housing market downturns, each with distinct theoretical implications for housing price resilience:

General Bonds: During market corrections, local governments strategically increase general bond issuance to finance public services and infrastructure that enhance residential attractiveness. Similar to Western contexts where homeowners prefer higher government spending on quality public services that capitalize into house prices (Tiebout, 1956; Fischel, 2001; Hilber & Mayer, 2009), Chinese local governments utilize general bonds to finance education, healthcare, and amenities that maintain housing demand and price levels. Unlike in boom periods when these investments might be financed through land revenues, during downturns, bond financing becomes the principal counter-cyclical tool. This explains the theoretically expected positive relationship between general bond balances and housing price resilience during adjustment periods.

Special-Purpose Bonds: These bonds finance revenue-generating infrastructure projects that theoretically enhance long-term urban attractiveness and housing values. While individual infrastructure projects may cause localized negative externalities and NIMBY reactions, the aggregate effect of infrastructure investment should theoretically support housing values (Kohl & Wood, 2024). However, during market downturns, central government often strategically allocates special bonds toward affordable housing acquisition, introducing competing supply that may moderate price support effects (Li et al 2025, EPA paper). The theoretically ambiguous relationship between special bonds and housing prices during adjustments reflects these offsetting mechanisms.

LGFV Debt and Land Supply: LGFVs operate at the intersection of land and debt, using land-based financing to support urban development. During boom periods, LGFVs function as positive market catalysts, acquiring and developing land that signals continued growth momentum. However, theory suggests that during market corrections, high LGFV debt transforms into a fiscal burden that constrains intervention capacity through two channels: debt service crowds out resources available for market support, and central government regulatory pressure limits high-debt localities' ability to further deploy non-market interventions (Li, Wu, and Zhang (2023)). Simultaneously, land supply strategies transform from expansion-oriented during booms to restriction-oriented during corrections, as high land-finance-dependent cities strategically reduce supply to maintain price levels (Chang, Wang, and Xiong (2025)).

Spatial Differentiation in Response Capacity

The theoretical framework predicts spatially differentiated housing price resilience based on local government fiscal structures. Cities with stronger fiscal self-sufficiency should theoretically demonstrate greater intervention capacity through general service provision, while cities with adequate debt capacity retain flexibility to deploy counter-cyclical financing. Conversely, localities with heavy reliance on LGFV financing should face greater constraints during prolonged corrections as debt burdens accumulate.

This theoretical approach explains why identical housing market shocks produce heterogeneous outcomes across China's urban landscape. Local government fiscal structures not only shape intervention capacity but also determine strategic priorities between price maintenance and market adjustment. These theoretical mechanisms provide the foundation for our empirical investigation into how fiscal indicators predict housing price resilience during China's post-2021 market correction.

2.2.3 Fiscal Pressure and Spatial Differentiation

Recent studies reveal how local governments' fiscal conditions shape their intervention capacity during market downturns. Chen et al. (2023) identified that real estate market prosperity significantly promotes local government debt expansion, with land finance acting as both mediator and moderator. During real estate booms, local governments tend to sell more land, reinforcing debt-raising behavior; during downturns, they decrease debt but face significantly increased repayment risks.

Chang, Wang, and Xiong (2025) documented that during the COVID-19 pandemic (2020-2022), cities more dependent on land sales and land-collateralized debt before the pandemic experienced greater increases in land prices during the market correction. LGFVs purchased more land at higher prices compared to other buyers, underscoring local governments' active role in maintaining market stability under fiscal pressure.

This spatial differentiation in housing price resilience reflects local governments' varying fiscal structures and intervention capabilities. As Feng, Wu, and Zhang (2022) demonstrated, although the cen-

tral state implemented stringent regulations on financing platforms, local governments have supported these platforms differently across regions, resulting in divergent local financing patterns.

2.2.4 Research Gaps and Contributions

While existing literature provides valuable insights, several research gaps remain. First, studies primarily focus on market expansion periods, with limited systematic analysis of mechanism changes during post-2022 adjustment phases. Second, research has inadequately decomposed local government fiscal indicators to identify distinct impact pathways of different debt types. Third, insufficient attention has been given to land supply as a mediating mechanism between fiscal conditions and housing prices.

Our research addresses these gaps by: (1) distinguishing between general bonds, special-purpose bonds, and LGFV debt to reveal their differential impact mechanisms across market phases; (2) analyzing land supply as a mediating variable to understand how local governments strategically deploy land resources to achieve fiscal and market objectives; and (3) comparing patterns across regions and city tiers to provide new theoretical perspectives on China's spatially differentiated housing market resilience during downturns.

This comprehensive investigation not only enhances understanding of China's real estate market dynamics but also contributes an analytic framework for understanding non-equilibrium adjustments in global real estate markets in the post-pandemic era, with implications that extend beyond China's specific context to inform debates on the fiscal-property nexus in urban governance.

3. Empirical framework

3.1 Research Data and Sample Selection

We construct a comprehensive dataset covering over 300 Chinese cities to examine the relationship between fiscal structures and housing price dynamics. While housing price data is available for major cities starting from 2015, we restrict our primary analysis to the 2016–2024 period. This restriction ensures consistent fiscal data availability across the urban hierarchy and mitigates survivorship bias by excluding the early boom phase where data was skewed toward top-tier cities. Our descriptive sample accounts for approximately 94% of China's total GDP in 2022; the effective sample size varies across regression specifications depending on variable availability, with exact sample sizes reported in each table.

Housing price data are primarily sourced from monthly average second-hand listings on Anjuke, selected for its granular coverage across China's diverse administrative hierarchy—from provincial capitals to remote autonomous prefectures. We validate these market trends using the National Bureau of Statistics' 70-city indices as a reference for major metropolitan areas.

To further assess the accuracy of the Anjuke listing series, we cross-validate it against a micro-level dataset of **5.8 million verified housing transactions** covering **112 major cities over 2018–2024**. Figure Figure 1 presents two complementary validations. Panel **(A)** compares city-year median listing prices with city-year median transaction prices, showing an almost one-to-one relationship (correlation = **0.982**). Panel **(B)** compares city-year price growth rates computed from Anjuke listings with growth rates computed from the transaction dataset (correlation = **0.725**), confirming that the listing series captures market fluctuations with substantial accuracy.

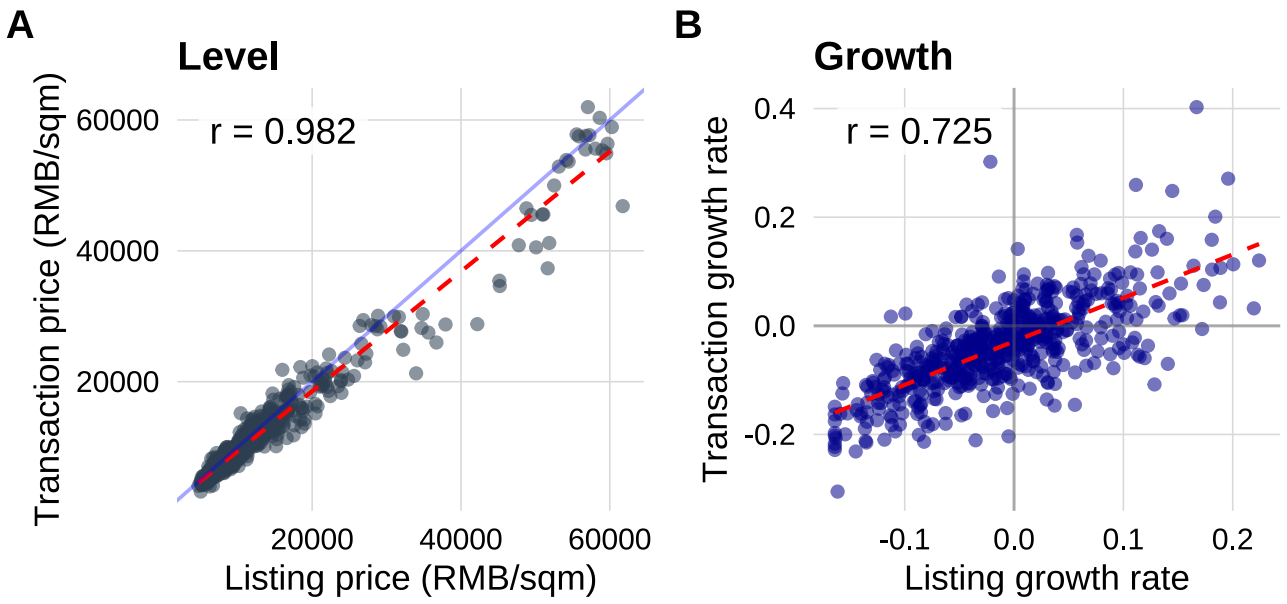

Figure 1: Data quality validation using micro transactions (112 cities, 2018–2024). Panel (A): levels—city-year median listing price (Anjuke) vs. median transaction price (micro transactions), correlation = 0.982. Panel (B): dynamics—correlation of city-year price growth rates between Anjuke listings and micro transaction prices, correlation = 0.725.

We also observe a stable level gap: transaction prices are consistently below listing prices, with a median bargaining discount of 3.8% (Transaction < Listing). This gap explains the difference in price levels but does not undermine the ability of the Anjuke series to capture cross-city differences and time variation in market conditions.

Fiscal and economic data are integrated from multiple authoritative sources. Local government fiscal indicators, including general bonds, special bonds, and LGFV debt, are compiled from the Enterprise Warning Database (qiye yujing tong), which systematically tracks explicit and implicit debt across China's urban system. Macroeconomic and demographic statistics are drawn from China City Statistical Yearbooks, while land supply and transfer data are sourced from China Index Academy.

Market liquidity indicators are constructed from Beike's transaction-level microdata covering 112 cities with approximately 5.8 million individual transactions. Days on Market (DOM) measures the duration between initial listing and sale. We define "stale share" as the proportion of listings in a city-year that remain unsold beyond one year, capturing the accumulation of persistent illiquid inventory.

For analytical purposes, we divide the study period into two distinct market phases: the expansion phase (2016–2021) and the adjustment phase (2022–2024). This periodization is informed by structural break analysis (Section 3.2), which identifies late 2021 to early 2022 as the predominant turning point across the urban hierarchy.

3.2 Structural Break Detection Method

To identify critical turning points in China's real estate market, we employ a structural break detection approach to analyze monthly housing price data from April 2015 to December 2024. A multiple breakpoint detection technique was utilized based on the Bai and Perron (1998, 2003) framework, which can

simultaneously identify multiple structural change points in time series. Formally, for a time series model with potentially m breakpoints:

$$y_t = x_t'\beta_j + u_t, \quad t = T_{j-1} + 1, \ldots, T_j$$

where $j = 1, \ldots, m+1$ represents intervals, $T_0 = 0$ and $T_{m+1} = T$ are sample boundaries, and $T_1, \ldots, T_m$ denote breakpoint positions to be identified. The breakpoint detection process is solved by minimizing the residual sum of squares (RSS):

$$\min_{T_1,\ldots,T_m} \sum_{j=1}^{m+1} \sum_{t=T_{j-1}+1}^{T_j} [y_t - x_t'\beta_j]^2$$

The optimal number of breakpoints is determined using the Bayesian Information Criterion (BIC):

$$\text{BIC}(m) = \ln \hat{\sigma}^2(m) + (m+1)p\frac{\ln(T)}{T}$$

where $\hat{\sigma}^2(m)$ is the estimated residual variance of the model with m breakpoints, and p is the number of parameters in each segment. we implement this method using the `strucchange` package in R and employ the Chow test to evaluate the statistical significance of identified breakpoints.

3.3 Empirical Model Specification

Our analytical approach combines spatial pattern analysis with panel regression techniques. The spatial analysis maps housing price corrections across cities to identify geographical patterns of market resilience, examining variations across city tiers, regions, and administrative hierarchies. This establishes the empirical puzzle of spatial differentiation that our subsequent regression analysis aims to explain.

Our regression framework employs fixed effects panel models that control for unobserved city-specific characteristics and common time trends. The baseline specification is:

$$\Delta P_{i,t} = \alpha + \beta \cdot \text{Fiscal}_{i,t-1} + \gamma \cdot X_{i,t-1} + \mu_i + \lambda_t + \varepsilon_{i,t}$$

Where:

- $\Delta P_{i,t}$ represents housing price growth in city i at time t
- $\text{Fiscal}_{i,t-1}$ represents lagged fiscal variables including:
  - General bond balance to GDP ratio
  - Special-purpose bond balance to GDP ratio
  - LGFV debt balance to GDP ratio
  - Fiscal self-sufficiency ratio
  - Land finance dependency (land transfer revenue to public budget revenue ratio)
  - Unutilized debt capacity
- $X_{i,t-1}$ represents control variables including:

  - Economic growth (GDP growth rate)
  - Industrial structure (tertiary industry ratio)
  - Population growth rate
  - Housing affordability (square meter/annual income)

- μ_i and λ_t represent city and time fixed effects
- $\varepsilon_{i,t}$ is the error term

To assess how fiscal-housing relationships vary across spatial contexts, we estimate this model separately for different subsamples defined by market phase (boom period 2015-2021 vs. adjustment period 2022-2024), region (Eastern, Central, Western, and Northeastern China), and urban hierarchy position (Tier 1, New Tier 1, Tier 2, Tier 3, and Tier 4+ cities).

3.4 Supply Adjustment and Liquidity Outcomes

To examine how fiscal structures shape housing market resilience beyond price effects, I analyze two outcome dimensions: land supply adjustment and market liquidity.

First, I estimate whether fiscal–financial conditions correlate with local governments' supply behavior during the downturn. The dependent variable is the annual change in per-capita listed land supply (ΔSupply_{it}), regressed on lagged fiscal variables interacted with a downturn indicator (Bust = 1 for 2022 onward). This specification tests whether fiscal exposure constrains or facilitates supply retrenchment when market conditions deteriorate.

Second, I examine liquidity stratification using two measures: Days on Market (DOM) and "stale share." The stale share regression includes a lagged dependent variable to capture persistence dynamics—a high autoregressive coefficient indicates a self-reinforcing liquidity trap where illiquidity accumulates rather than clears.

Both analyses employ two-way fixed effects (city and year) with standard errors clustered at the city level. Rather than claiming strict causal identification, I interpret these estimates as conditional associations that illuminate how fiscal structures correlate with supply behavior and liquidity outcomes across the urban hierarchy.

3.5 Robustness Tests

To ensure the reliability of our findings, we conduct two robustness checks and one additional validation exercise. First, we employ alternative periodization using 2021 as the cutoff between boom and adjustment periods to account for varying peak timing across the urban hierarchy. Second, we compare our dataset with the official National Bureau of Statistics 70-city housing price indices to validate the spatial patterns of market adjustment.

Third, we re-estimate the baseline specifications using a transaction-based price measure. Using the same micro transaction dataset (112 cities, 2018–2024), we construct a city-year hedonic transaction price index for the overlapping set of cities (110 cities with complete coverage) and merge it with our main panel. Replacing the Anjuke listing-price outcome with the transaction-based index yields highly consistent estimates: the sign, magnitude, and statistical significance of the core fiscal variables remain materially unchanged, indicating that our main conclusions are not an artifact of listing-market measurement.

These checks confirm that our core findings regarding the transformation of fiscal–housing relationships across market phases remain consistent across alternative periodization choices and alternative price measures, enhancing the credibility of our conclusions about how fiscal structures shape housing price resilience across China's urban system.

4. Spatiotemporal Patterns of China's Housing Market Adjustment

4.1 Temporal Evolution and Structural Breakpoints

The Chinese housing market has exhibited distinct cyclical patterns with significant variation in peak timing across the urban hierarchy. Figure 2 illustrates the temporal distribution of market peaks across city tiers. According to the median peak dates, the majority of Chinese cities reached their price peaks between mid-2021 and early 2022: Tier 3 cities in May 2021, Tier 2 cities in July 2021, New Tier 1 cities in August 2021, and Tier 4 and below cities in January 2022, with only Tier 1 cities peaking later in August 2022.

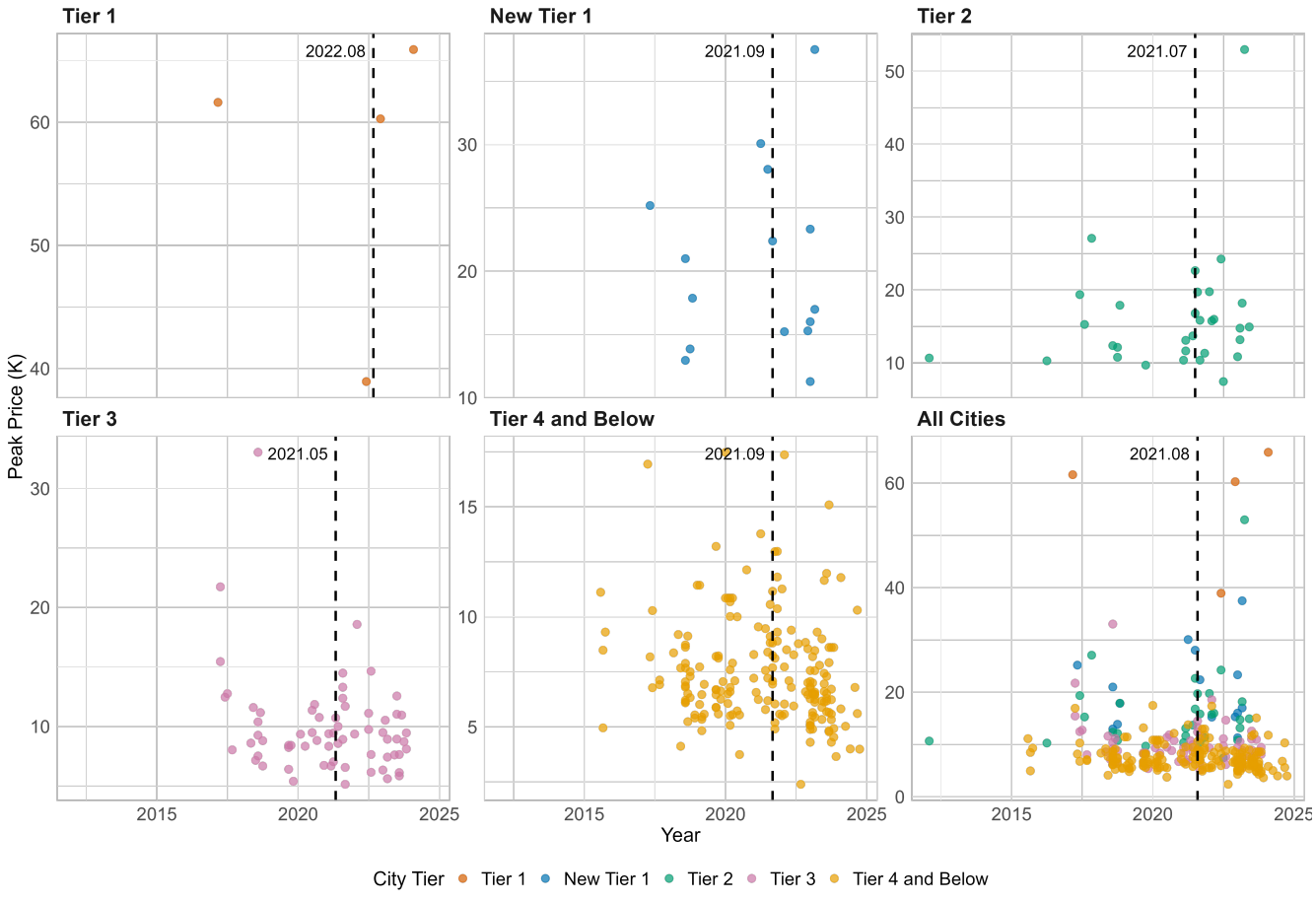

Figure 2: Housing Price Changes by City Tier and Region (Peak-to-2024 and 2022-2024)

Utilizing a balanced panel of monthly housing prices (n=186), the breakpoint regression analysis reveals that China's real estate market experienced four statistically significant structural change points

between April 2015 and December 2024: December 2016, October 2018, September 2021, and May 2023 (as illustrated in Figure 3).

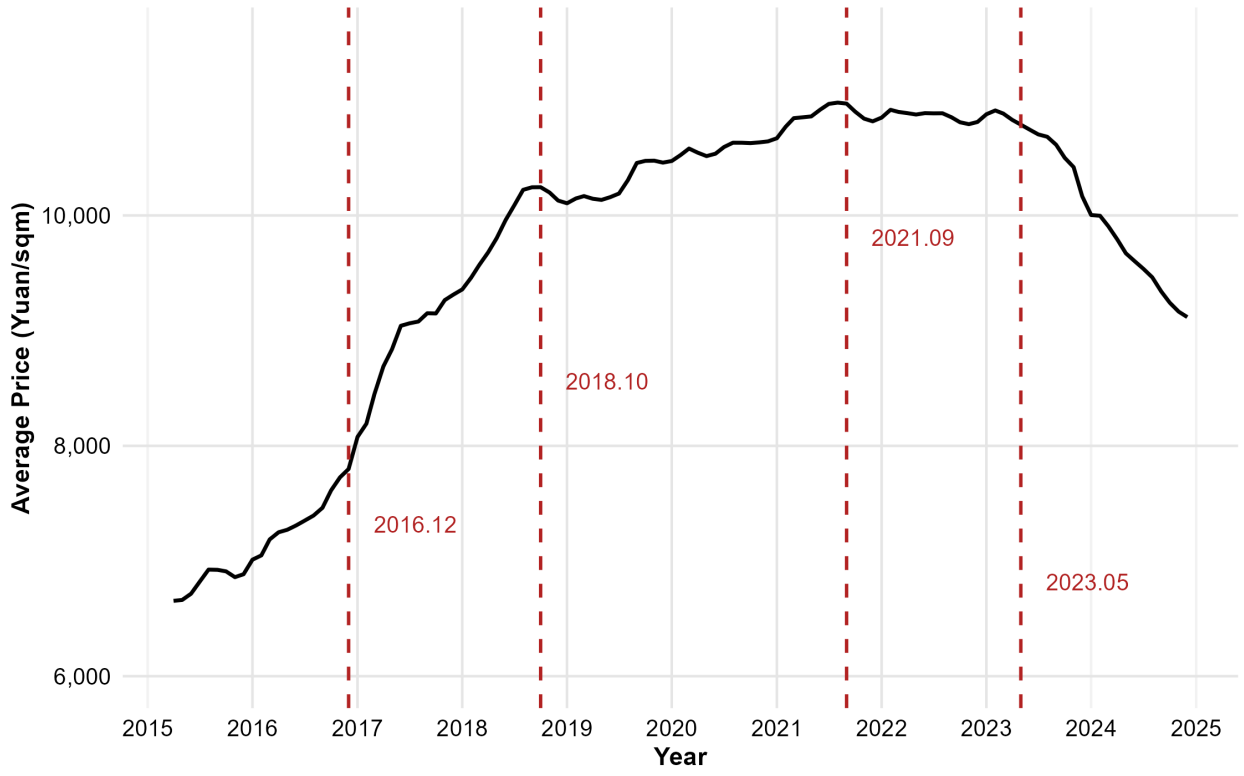

Figure 3: Structural Breakpoints in China's Housing Market Prices, 2015-2025

The Chow test confirms that all identified breakpoints are statistically significant at the 1% level, verifying that these time points indeed represent structural shifts in price trends. Segmented regression analysis further illuminates the characteristics of each market phase. During the first two phases, housing prices rose rapidly at average monthly rates of 1% and 1.2%, respectively. Between October 2018 and September 2021 (coinciding precisely with the collapse of Evergrande), the growth rate decelerated significantly to 0.2%, reflecting a market adjustment transition period. Subsequently, the monthly growth rate turned negative at -0.07%, signaling the market's entry into a downturn. Following May 2023, the downward trajectory intensified substantially, with prices declining at an average monthly rate of -0.84%.

The spatial diffusion of housing price decline in China after 2021 reveals distinctive geographical patterns. Northeastern provinces (Heilongjiang), Inner Mongolia, areas surrounding Beijing, Guangxi, the outer Pearl River Delta, and some non-central western cities were the first to experience continuous price drops, as shown in dark purple. Interestingly, the map demonstrates a clear "siphoning effect" around first-tier cities like Beijing and Guangzhou, where surrounding cities began declining earlier than the core cities themselves. In contrast, the Yangtze River Delta, southern provinces (particularly Hunan and Jiangxi), and Shaanxi exhibited greater price resilience, experiencing declines significantly later.

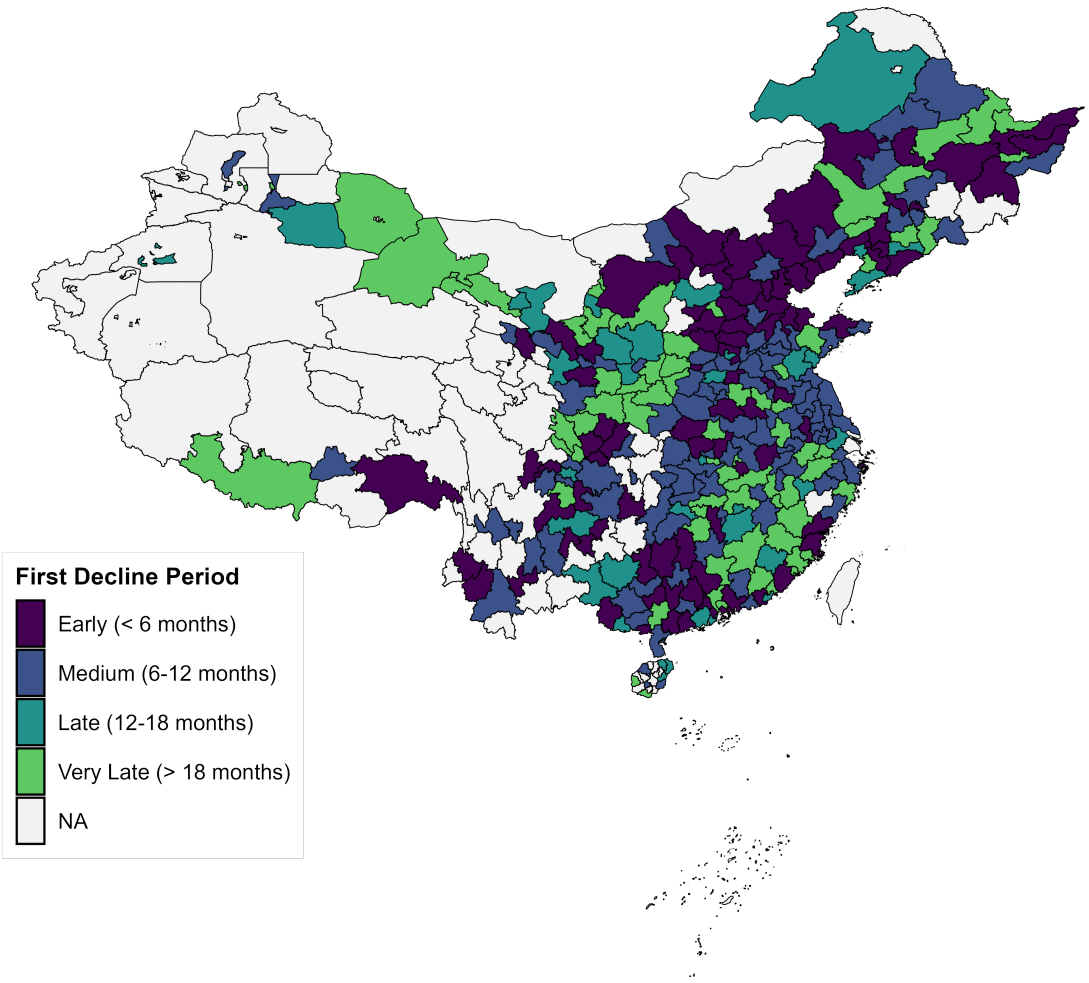

Figure 4: Spatial diffusion of housing price decline after 2021

Based on the breakpoint regression analysis and the temporal distribution of housing price peaks across cities, we select January 2022 as the demarcation point between boom and bust periods. While the structural breakpoint analysis identifies September 2021 as a significant change point, using 2022 is methodologically necessary as city-level explanatory variables are only available in annual rather than monthly intervals. Additionally, the 2022 threshold ensures that most cities in the sample had entered or were about to enter their downward trajectory, allowing for more comprehensive measurement of market correction patterns. Alternative specifications using 2021 as the threshold or city-specific thresholds with city-specific price maxima as inflection points are employed in robustness checks to account for the earlier structural break and the earlier peaks observed in higher-tier cities.

4.2 Spatial Heterogeneity in Housing Price Resilience

A distinctive "barbell effect" characterizes the magnitude of housing price corrections across the urban hierarchy (Figure 5). Both Tier 1 cities (-17.2% from peak, -8.60% during 2022-2024) and Tier 4+ cities (-15.1% from peak, -7.42% during 2022-2024) demonstrate substantially greater price resilience compared

to mid-tier cities. New Tier 1, Tier 2, and Tier 3 cities experienced significantly more pronounced corrections, with peak-to-2024 declines of -25.8%, -26.6%, and -22.1% respectively. This U-shaped resilience distribution challenges conventional expectations that higher-tier cities would universally demonstrate superior market stability.

Geographic patterns reveal additional complexity beyond the urban hierarchy effects. The East region experienced the most severe corrections (-25.2% from peak, -16.7% during 2022-2024), closely mirroring the vulnerability of mid-tier cities. In contrast, the West region exhibited remarkable resilience (-12.3% from peak, -5.29% during 2022-2024), performing even better than Tier 1 cities, with a quarter of its cities experiencing no net decline or even price increases since 2022. Central (-19.9% from peak, -12.5% during 2022-2024) and Northeast (-16.9% from peak, -10.1% during 2022-2024) regions fell between these extremes. This geographic divergence suggests that regional economic fundamentals and policy implementations may exert influence comparable to, or even exceeding, the effects of urban hierarchy positioning.

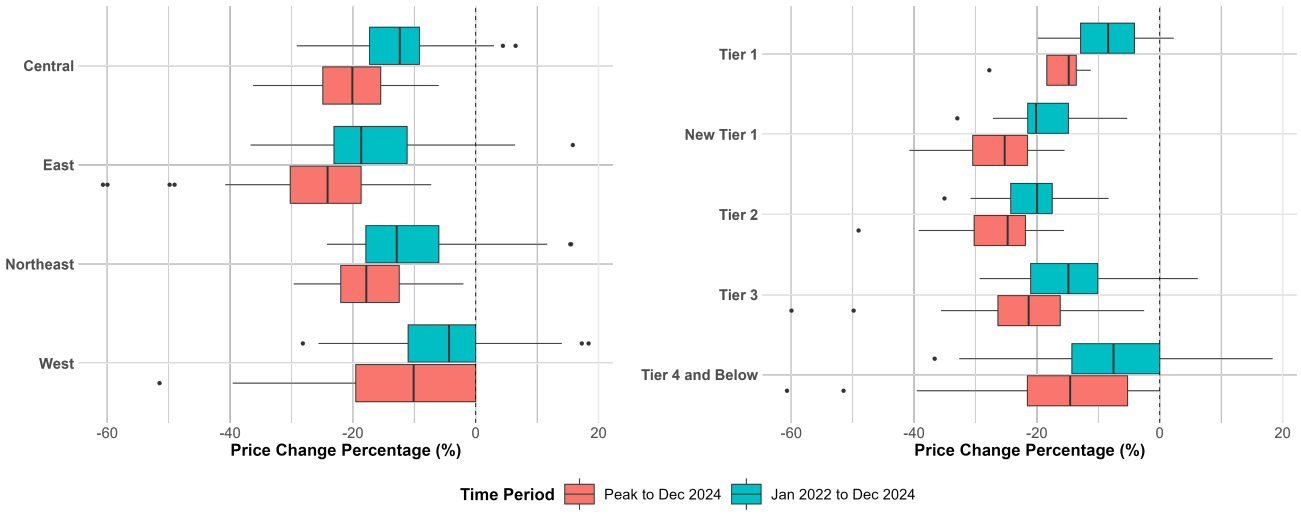

Figure 5: Housing Price Changes by City Tier and Region (Peak-to-2024 and 2022-2024)

Figure 6 reveals further spatial differentiation, with Western regions showing the strongest resilience (-12.3% from peak), followed by Northeastern (-16.9%), Central (-19.9%), and Eastern regions (-25.2%). This pattern presents a noteworthy inversion of traditional regional development hierarchies, as economically advanced Eastern regions experienced the most severe corrections rather than less developed areas. Figure 4's spatial distribution map confirms substantial intra-regional variation, particularly within Eastern and Central China, with pronounced correction clusters in the Yangtze River Delta, Pearl River Delta, and certain Central provincial capitals.

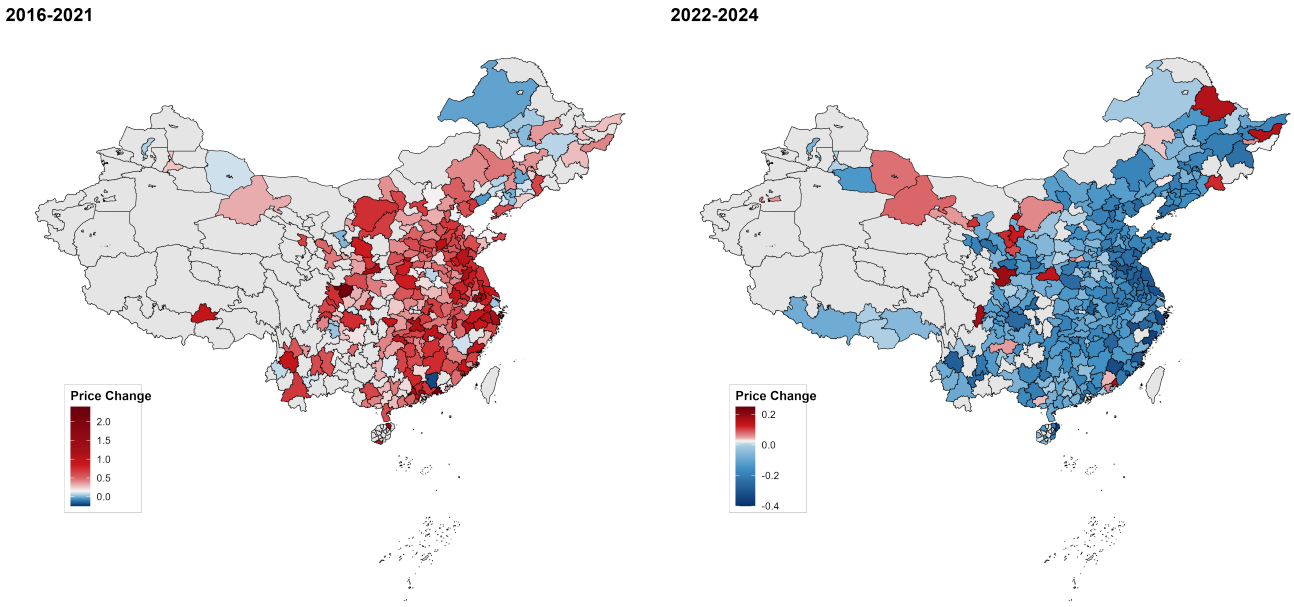

Figure 6: Housing Price Changes During Boom and Adjustment Periods Across 303 Chinese Cities

4.3 Fiscal Indicators and Structural Transformation

The evolution of fiscal indicators across city tiers, depicted in Figure 7 and Table 1, reveals structural disparities and temporal transformations that potentially explain the observed housing price resilience patterns.

Table 1: Overall Sample Descriptive Statistics (Mean and Distribution)

Variable	N	Mean	SD	Median
Housing Price Growth Rate	2259	0.034	0.108	0.015
Fiscal Self-Sufficiency Rate	2803	0.372	0.213	0.325
Land Revenue/Fiscal Revenue	2300	0.667	0.501	0.552
Unutilized Debt Capacity	2648	0.067	0.066	0.050
General Bond Balance/GDP	2636	0.288	0.150	0.260
Special Bond Balance/GDP	2608	0.135	0.091	0.114
LGFV Debt Balance/GDP	2499	0.254	0.245	0.180
Land Supply per 10,000 Persons	1401	1.140	0.807	0.953
GDP Growth Rate	2872	0.055	0.030	0.059
Tertiary Industry Ratio	2778	0.483	0.089	0.480
Population Growth Rate	2350	-0.001	0.025	0.000
Housing Price-to-Income Ratio	2183	0.209	0.100	0.186

Note:
The Land Supply per 10,000 Persons variable is measured in square meters per ten thousand persons (m^2 per 10,000 persons).

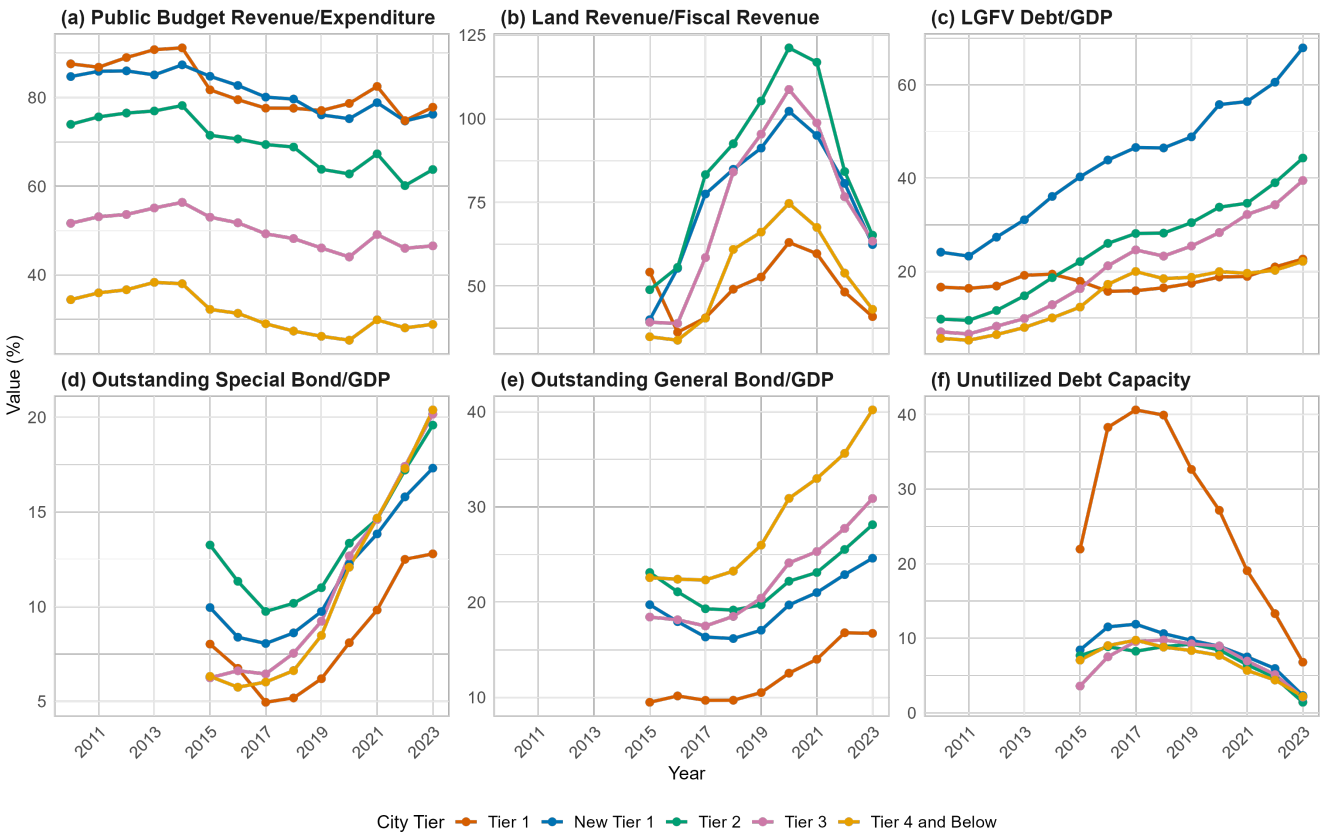

Figure 7: Fiscal Indicator Trends by City Tier (2010-2023)

Table 2: Descriptive Statistics by City Tier and Year (Mean Values)

Variable	Tier 1			New Tier 1			Tier 2			Tier 3			Tier 4 and Below		
	2017	2021	2023	2017	2021	2023	2017	2021	2023	2017	2021	2023	2017	2021	2023
Number of Cities	4	4	4	14	14	14	30	30	30	65	65	65	129	181	189
Housing Price Growth Rate	0.122	0.027	-0.004	0.256	0.063	-0.028	0.214	0.034	-0.042	0.202	0.027	-0.012	0.126	0.016	0.001
Fiscal Self-Sufficiency Rate	0.776	0.825	0.778	0.806	0.791	0.763	0.694	0.673	0.638	0.493	0.491	0.465	0.344	0.335	0.315
Land Revenue/Fiscal Revenue	0.516	0.597	0.409	0.763	0.935	0.606	0.833	1.169	0.652	0.585	0.988	0.634	0.480	0.748	0.461
Unutilized Debt Capacity	0.406	0.191	0.068	0.120	0.075	0.023	0.083	0.064	0.014	0.096	0.069	0.021	0.095	0.059	0.020
General Bond Balance/GDP	0.097	0.140	0.167	0.163	0.211	0.247	0.193	0.231	0.281	0.175	0.253	0.309	0.209	0.313	0.379
Special Bond Balance/GDP	0.050	0.098	0.128	0.079	0.138	0.173	0.098	0.146	0.196	0.064	0.146	0.202	0.061	0.145	0.201
LGFV Debt Balance/GDP	0.159	0.189	0.227	0.467	0.529	0.632	0.282	0.346	0.443	0.246	0.322	0.395	0.198	0.204	0.231
Land Supply/Population	0.422	0.561	0.430	1.160	1.178	0.850	1.187	1.283	0.960	1.057	1.340	1.118	0.830	1.150	0.879
GDP Growth Rate	0.073	0.081	0.052	0.078	0.080	0.053	0.075	0.078	0.054	0.075	0.077	0.056	0.068	0.079	0.053
Tertiary Industry Ratio	0.706	0.723	0.704	0.550	0.575	0.571	0.508	0.536	0.532	0.446	0.479	0.488	0.453	0.460	0.465
Population Growth Rate	0.025	0.002	0.004	0.022	0.014	0.006	0.020	0.007	0.004	0.001	0.001	-0.002	-0.005	-0.002	-0.001
Housing Price-to-Income Ratio	0.780	0.654	0.632	0.333	0.305	0.278	0.297	0.275	0.239	0.225	0.212	0.192	0.185	0.172	0.163

Fiscal self-sufficiency ratios (Figure 7 a) and local government outstanding debt (Figure 5d) display complementary mirror-image patterns, revealing the fundamental fiscal dilemma facing different tiers of Chinese cities. Self-sufficiency ratios exhibit a clear hierarchical pattern, decreasing progressively from Tier 1 to Tier 4+ cities, while outstanding debt burdens show the inverse relationship. This complementary pattern reflects the strategic tradeoffs in China's fiscal system: cities with stronger tax bases and self-generating revenues (higher-tier cities) can maintain lower formal debt levels, while cities with weaker revenue-generating capacity (lower-tier cities) must increasingly rely on explicit debt financing to fulfill development and service obligations. All city tiers show declining self-sufficiency since 2015, but the steepest deterioration appears in Tier 4+ cities, where self-sufficiency dropped below 30% by 2023, accompanied by formal debt burdens approaching 40% of GDP—the highest among all tiers.

Land transfer revenue dependency (Figure 7 b) exhibits pronounced cyclical fluctuations with a precipitous decline after 2020. Tier 2 cities reached the highest peak at 121% in 2020, followed by Tier 3 (109% in 2020) and New Tier 1 cities (102% in 2020), indicating that land sales revenues exceeded annual fiscal revenue in these mid-tier cities during the boom period. Following the peak, all tiers experienced sharp contractions: by 2023, Tier 2 cities declined to 65%, New Tier 1 to 62%, and Tier 3 to 63%. Notably, Tier 1 cities maintained more moderate land finance dependency throughout, peaking at 63% in 2020 and declining to 41% by 2023, while Tier 4+ cities showed the lowest dependency, reaching only 75% at peak (2020) and falling to 43% by 2023. This revenue contraction preceded or coincided with housing price corrections, suggesting that land market cooling functions as a leading indicator for housing price declines.

LGFV debt (Figure 7 c) presents a distribution pattern contrary to explicit debt, with the highest ratios in New Tier 1 cities, which increased dramatically from approximately 24% in 2010 to nearly 70% in 2023—a threefold increase. Tier 2 cities follow with approximately 44% in 2023, while both Tier 1 and Tier 4+ cities maintain relatively lower implicit debt ratios around 22%. This pattern reflects the differentiated financing strategies across city tiers: mid-tier cities (New Tier 1 and Tier 2) have most aggressively leveraged market-oriented financing vehicles operated by LGFVs, which typically fund infrastructure and urban development projects expected to generate returns through land value appreciation.

Outstanding special purpose bonds (Figure 7 d) show rapid growth across all tiers since 2016, with lower-tier cities (Tiers 2-4+) converging at approximately 20% by 2023, significantly higher than Tier 1 cities' 13%. Similarly, outstanding general bonds (Figure 7 e) demonstrate an inverse relationship with city tier, with Tier 4+ cities approaching 20% in 2023 while Tier 1 cities remain at approximately 4%. This composition of explicit debt reflects their distinct purposes: special purpose bonds primarily fund revenue-generating infrastructure projects, while general bonds primarily finance public welfare projects without direct revenue streams. Figure 7 f shows that local governments' unutilized debt capacity briefly increased from 2015-2017, followed by a rapid decline, especially in first-tier cities. By 2023, all city categories had converged to debt capacity levels below 10%, indicating a significant reduction in fiscal flexibility across China's urban hierarchy.

This comprehensive fiscal structure differentiation corresponds closely with observed housing price correction patterns. New Tier 1 and Tier 2 cities exhibit a characteristic combination of "high implicit debt, low explicit debt" while Tier 3 and Tier 4+ cities demonstrate "high explicit debt, relatively lower implicit debt," and Tier 1 cities maintain comparatively moderate overall debt burdens. This differentiation reflects fundamental differences in financing strategies and capabilities: mid-tier cities have more aggressively pursued market-oriented financing through LGFVs to fund growth-enhancing infrastructure, creating greater exposure to market volatility when revenue streams from land sales contract. Lower-tier cities, with less access to market-based financing, have relied more heavily on explicit government bonds

with their formal repayment guarantees and central government oversight, potentially creating more stable but constrained fiscal environments. Tier 1 cities, with their robust revenue bases, have maintained greater fiscal space with moderate reliance on both financing channels.

4.4 Boom-Bust Asymmetries and the Limited Role of Mean Reversion

We first examine the bivariate association between housing price growth and fiscal variables across market regimes in Figure 8. Observations from the boom period cluster on the right (higher price growth), while those from the downturn cluster on the left (weak or negative price growth). The sign and strength of the bivariate relationships shift systematically across regimes. During the boom, growth in explicit debt variables—general and special bonds—tends to be weakly negatively related to house-price growth, whereas land-revenue growth and LGFV-debt growth appear strongly pro-cyclical (positively associated with price growth). During the downturn, these patterns change: the relationship for explicit debt becomes weakly positive, while the LGFV-debt relationship reverses and land-revenue growth becomes largely decoupled from (or weakly negatively related to) house-price growth.

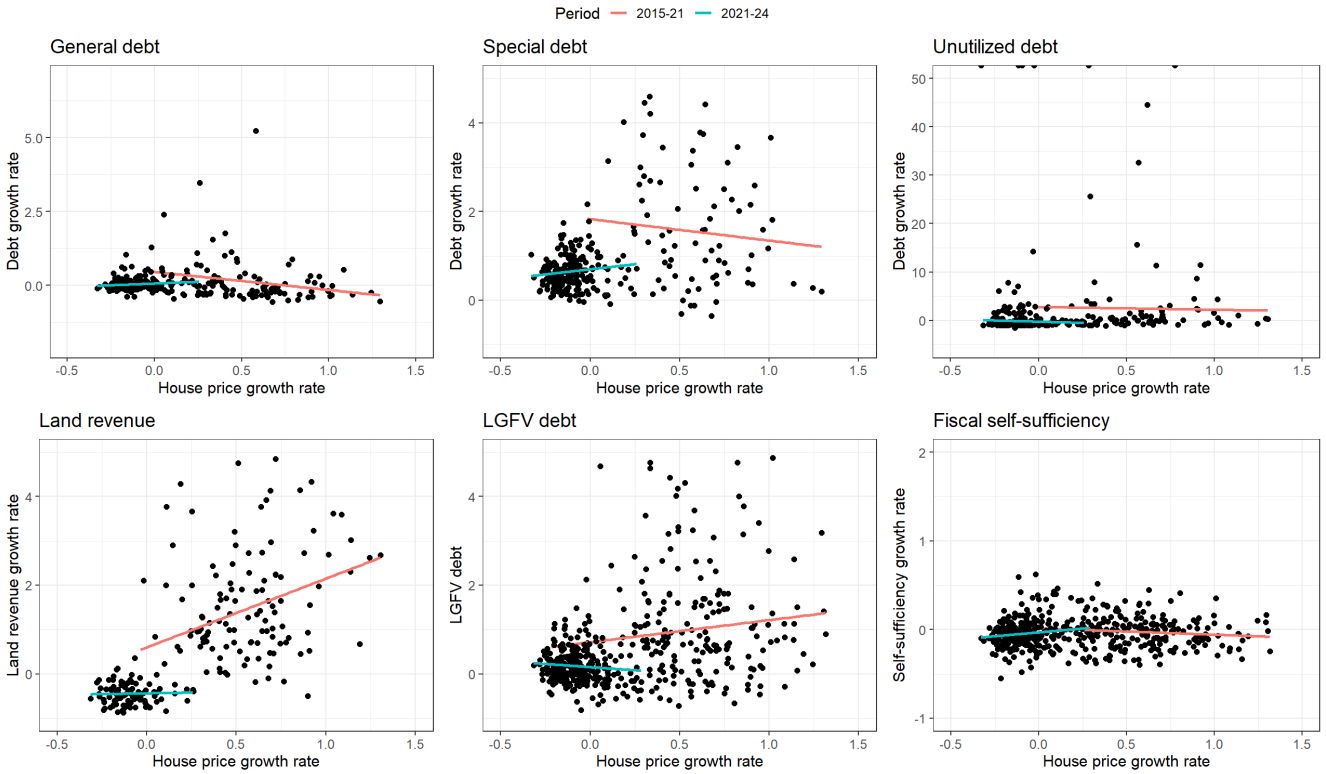

Figure 8: Boom–Bust Shifts in the Fiscal–Housing Growth Relationship

While Figure 8 highlights regime-dependent changes in fiscal–housing relationships, before examining mechanisms in the next section we address an alternative explanation: could the observed spatial heterogeneity simply reflect mechanical mean reversion? That is, do cities that experienced larger boom-period appreciations naturally experience proportionally larger corrections, regardless of fiscal conditions?

Figure 9 provides evidence against this simple interpretation. Under perfect mean reversion, boom-period appreciation would predict adjustment-period decline one-for-one (slope = 1.0; dashed line). In-

stead, the fitted relationship is shallow: the slope is approximately 0.079, far below the perfect-symmetry benchmark. Substantively, a city that appreciated by 100% during the boom would be predicted to decline by only about 7.9% during 2022–2024, indicating substantial downward price stickiness rather than mechanical mean reversion.

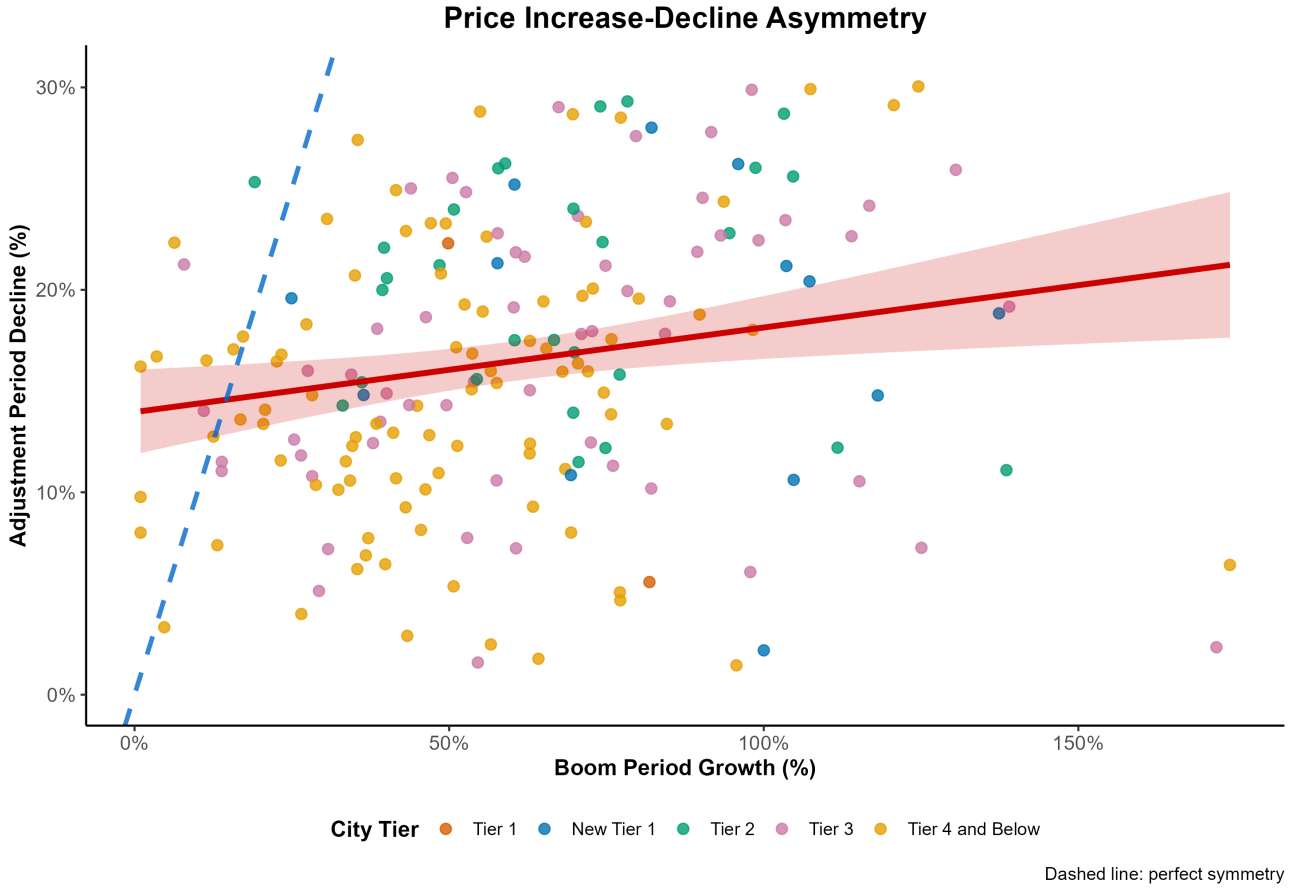

Figure 9: Boom-Bust Price Asymmetry Across Chinese Cities

To formally test whether fiscal-structural factors add explanatory power beyond prior appreciation, Table 3 presents a nested model comparison. Model (1) includes prior appreciation only and explains 10.1% of the cross-city variation in adjustment-period declines ($R^2 = 0.101$). Adding fiscal variables in Model (2) raises R^2 to 0.221 ($\Delta R^2 = +0.119$), and the prior-appreciation coefficient falls from 0.079 to 0.053 (about a 33% reduction), suggesting that part of the apparent "mean reversion" reflects underlying fiscal structure. Model (3) adds comprehensive controls and yields $R^2 = 0.233$ ($\Delta R^2 = +0.132$ relative to Model 1), confirming that fiscal-structural determinants explain a substantial share of the spatial heterogeneity in housing price resilience.

Having established that fiscal-structural factors dominate simple mean-reversion dynamics, we now turn to the mechanisms through which different fiscal instruments shape housing price resilience across market phases.

Table 3: Prior Appreciation vs. Fiscal-Structural Determinants

Model	Prior Growth Coef.	R^2	ΔR^2	N
(1) Prior Appreciation Only	0.079 ***	0.101	–	202
(2) + Fiscal Variables	0.053 ***	0.221	+ 0.119	202
(3) + All Controls	0.055 ***	0.233	+ 0.132	202

Note: Dependent variable is adjustment period price decline (2022-2024). Fiscal variables include general bonds, special bonds, LGFV debt, fiscal self-sufficiency, land revenue, and unutilized debt capacity. All controls add GDP growth, tertiary industry ratio, population growth, and price-income ratio. *** $p < 0.01$

5. The Fiscal-Property Nexus

Our panel estimates indicate that the fiscal–housing relationship is not static: the same fiscal instrument can behave very differently across market regimes. Table 4 summarizes this "fiscal–property resilience nexus" by reporting split-sample estimates for the Boom Phase and the Adjustment Phase, alongside an interaction specification that formally tests whether effects shift when the market enters the adjustment period.

5.1 Phase-Dependent Transformation of Fiscal Effects

Across specifications, the most consistent pattern is a growing divergence between explicit fiscal channels (general and special-purpose bonds) and implicit leverage (LGFV debt). Importantly, the split-sample results provide the clearest "regime description," while the interaction model identifies whether the change between regimes is statistically meaningful.

5.1.1 General Bonds: From Background Condition to Stabilization Capacity

General bond issuance is weakly related to prices during booms but becomes strongly supportive during market corrections. In the split-sample results shown in Table 4, the boom-period coefficient is economically small and statistically insignificant, whereas during the adjustment phase it becomes large and highly significant.

The interaction model refines this interpretation: general bonds are positively associated with housing price growth in the baseline regime, and the marginal effect increases further during adjustments. Taken together, the evidence suggests that explicit general-budget credit is increasingly capitalized into housing-market resilience once private liquidity tightens and fiscal credibility becomes more salient.

5.1.2 Special-Purpose Bonds: A Suppression Channel That Intensifies in Downturns

Special-purpose bonds display a markedly different explicit-debt channel. In the split-sample estimates, the boom-period effect is near zero and insignificant, but turns negative in the adjustment period.

The interaction model indicates that this downward influence is structurally stronger in downturns: the baseline association is negative, and it becomes more negative during adjustments. Substantively, this is consistent with an interpretation in which special bonds—often tied to project pipelines, infrastructure,

Table 4: Fiscal-Housing Price Relationships Across Market Phases

	Full Period	Interaction	Boom Phase	Adjustment Phase
Price Change (t-1)	0.25^{***}	0.25^{***}	0.08^{***}	0.20^{***}
	(0.02)	(0.02)	(0.03)	(0.04)
General Bond/GDP (t-1)	0.28^{***}	0.20^{***}	0.02	0.41^{***}
	(0.08)	(0.08)	(0.05)	(0.11)
Special Bond/GDP (t-1)	-0.39^{***}	-0.34^{***}	-0.03	-0.29^{*}
	(0.10)	(0.12)	(0.09)	(0.16)
Fiscal Self-Sufficiency (t-1)	0.08^{**}	0.06	0.05^{*}	0.05
	(0.04)	(0.04)	(0.03)	(0.05)
Unutilized Debt Capacity (t-1)	0.06	0.06	0.00	0.20^{***}
	(0.04)	(0.04)	(0.06)	(0.07)
Land Revenue/Fiscal Revenue (t-1)	-0.01	-0.01	-0.02^{**}	0.02^{**}
	(0.01)	(0.01)	(0.01)	(0.01)
LGFV Bond/GDP (t-1)	-0.01	0.06^{**}	-0.01	-0.13^{***}
	(0.02)	(0.02)	(0.02)	(0.03)
GDP Growth Rate (t-1)	0.09	0.07	0.21	0.03
	(0.08)	(0.08)	(0.13)	(0.09)
Tertiary Industry Ratio (t-1)	-0.08	-0.03	0.16^{**}	-0.17^{*}
	(0.06)	(0.06)	(0.06)	(0.10)
Population Growth Rate (t-1)	0.28^{***}	0.23^{***}	0.13	0.22^{***}
	(0.07)	(0.07)	(0.12)	(0.08)
Housing Price-Income Ratio (t-1)	-1.47^{***}	-1.54^{***}	-0.55^{***}	-2.30^{***}
	(0.07)	(0.07)	(0.06)	(0.16)
General Bond/GDP × Adjustment		0.15^{***}		
		(0.03)		
Special Bond/GDP × Adjustment		-0.19^{**}		
		(0.07)		
LGFV Bond/GDP × Adjustment		-0.07^{***}		
		(0.02)		
Land Revenue/Fiscal Revenue × Adjustment		0.00		
		(0.01)		
City Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
R^2	0.27	0.29	0.11	0.38
Num. obs.	1693	1691	1198	749

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

and (in the downturn) affordable-housing-related uses—do not translate into higher secondary-market valuations and may even amplify "cooling" or supply-side competition mechanisms during corrections.

5.1.3 LGFV Debt: Downturn Penalty and the Emergence of Fiscal Burden

The role of implicit leverage is most clearly counter-cyclical in a negative direction. In the split-sample results reported in Table 4, LGFV debt is essentially neutral during booms but becomes significantly negative during the adjustment phase.

The interaction model shows that the marginal effect of LGFV debt deteriorates sharply once the market enters the adjustment period. While the level coefficient remains positive in some specifications, the key inference is about the regime shift: the downturn substantially weakens (and, in the adjustment subsample, reverses) the association between implicit leverage and housing price growth. This pattern aligns with a "binding constraint" logic: when land revenues and cash flows weaken, LGFV repayment pressure and regulatory constraints can crowd out local policy space and weigh on market confidence.

5.1.4 Land Finance and Fiscal Capacity: Decoupling and Vulnerability in the Downturn

Land-finance variables provide a more nuanced picture than the debt instruments discussed above. In the split-sample estimates, the land-finance measure appears to change sign—negative in booms but positive in the adjustment period. However, this apparent "reversal" is not robust in the unified interaction framework: the land-finance interaction coefficient in Table 4 is extremely small and statistically insignificant, implying that we cannot reject equality of the land-finance slope across phases once the full set of covariates and fixed effects is imposed. Accordingly, we treat the split-sample sign change as suggestive and potentially specification-sensitive rather than definitive evidence of a structural break.

At the same time, the evidence more consistently supports a vulnerability interpretation for land-finance exposure during the downturn. In the adjustment period, higher land-finance dependence is associated with weaker price resilience (i.e., larger subsequent declines), indicating that land reliance does not operate as a stabilizer when the market turns. This interpretation is also consistent with the descriptive boom–bust patterns: land revenue growth is strongly pro-cyclical in booms but becomes markedly flattened in the downturn, suggesting a decoupling of the land channel once sales and prices weaken.

5.2 Regional Heterogeneity in the Fiscal-Property Nexus

The valuation of government credit is spatially differentiated (see Table 5). Using the Central region as the reference group, general bonds have significantly stronger positive associations with housing price growth in the East, followed by the Northeast and West. This implies a regionally stratified "fiscal premium," where explicit general-budget capacity is more effectively translated into housing-market resilience in regions with stronger economic and institutional fundamentals.

Special-purpose bonds show a distinct pattern: only the West exhibits a significant positive differential, while East and Northeast differentials are not statistically significant. This suggests a remaining infrastructure-return channel in inland markets, whereas in more mature coastal and northeastern markets, the marginal stabilization value of project-based debt is weaker.

Table 5: Regional Heterogeneity in Fiscal-Property Nexus (Interaction Model)

	(1)
Price Change (t-1)	0.178***
	(0.042)
East × General Bond/GDP (t-1)	0.893***
	(0.268)
Northeast × General Bond/GDP (t-1)	0.488*
	(0.273)
West × General Bond/GDP (t-1)	0.390**
	(0.163)
East × Special Bond/GDP (t-1)	0.003
	(0.122)
Northeast × Special Bond/GDP (t-1)	0.144
	(0.334)
West × Special Bond/GDP (t-1)	0.418**
	(0.186)
East × LGFV Bond/GDP (t-1)	-0.124**
	(0.055)
Northeast × LGFV Bond/GDP (t-1)	-0.095***
	(0.024)
West × LGFV Bond/GDP (t-1)	-0.088
	(0.118)
Observations	738
R^2	0.828
Adjusted R^2	0.727
Within R^2	0.419
City Fixed Effects	Yes
Time Fixed Effects	Yes

Note: The dependent variable is the yearly housing price growth rate. The table reports the interaction effects between regional dummies and lagged fiscal variables (Reference group: Central). **Controls: Yes.** Control variables include GDP growth, tertiary industry ratio, population growth, housing price-to-income ratio, fiscal self-sufficiency rate, unutilized debt capacity, and land transfer revenue. All explanatory variables are lagged by one year. Standard errors are clustered at the city level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Finally, LGFV debt differentials are negative and statistically significant in both the East and the Northeast. Overall, the results indicate that "shadow" leverage is priced as risk—especially in regions where deleveraging pressure and weaker growth prospects amplify concerns about repayment capacity.

5.3 City-Tier Differentiation: Explaining the Barbell Effect

Table 6 explains why resilience follows a "barbell" pattern across China's urban hierarchy by interacting fiscal variables with city-tier indicators (reference group: the Middle Tier, combining New Tier 1 and Tier 2).

Table 6: City-Tier Heterogeneity in Fiscal-Property Nexus (Interaction Model)

	(1)
Price Change (t-1)	0.204***
	(0.040)
Tier 1 × General Bond/GDP (t-1)	14.1***
	(5.32)
Tier 3 × General Bond/GDP (t-1)	0.399*
	(0.237)
Tier 4+ × General Bond/GDP (t-1)	0.442***
	(0.164)
Tier 1 × Special Bond/GDP (t-1)	1.66**
	(0.711)
Tier 3 × Special Bond/GDP (t-1)	0.080
	(0.136)
Tier 4+ × Special Bond/GDP (t-1)	0.325***
	(0.120)
Tier 1 × LGFV Bond/GDP (t-1)	-0.955**
	(0.381)
Tier 3 × LGFV Bond/GDP (t-1)	-0.074
	(0.066)
Tier 4+ × LGFV Bond/GDP (t-1)	-0.125***
	(0.040)
Observations	738
R^2	0.827
Adjusted R^2	0.727
Within R^2	0.417
City Fixed Effects	Yes
Time Fixed Effects	Yes

Note: The dependent variable is the yearly housing price growth rate. The table reports the interaction effects between city-tier dummies and lagged fiscal variables. The reference group is the **"Middle Tier" (combining New Tier 1 and Tier 2 cities)**. Control variables include land transfer revenue, GDP growth, tertiary industry ratio, population growth, housing price-to-income ratio, fiscal self-sufficiency rate, and unutilized debt capacity. All explanatory variables are lagged by one year. Standard errors are clustered at the city level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Tier 1 cities exhibit outsized sensitivity to explicit fiscal capacity: the marginal effect of general bonds is extremely large relative to the middle tier. Importantly, Tier 1 cities also show a significant positive differential for special-purpose bonds, indicating that in top-tier markets, multiple forms of explicit government credit can serve as credible signals that anchor expectations. At the same time, Tier 1 markets are strongly penalized for implicit leverage, underscoring that resilience in the top tier relies on maintaining credibility through explicit rather than implicit balance sheets.

At the other end, Tier + cities benefit from broad-based explicit support: both general bonds and special bonds have significantly more positive associations than in the middle tier. This pattern is consistent with a "policy-buffer" mechanism in smaller economies, where explicit fiscal spending more directly stabilizes local demand and prevents a full market freeze. Tier 4+ cities also exhibit a significant negative differential for LGFV debt, but the magnitude is far smaller than in Tier 1, suggesting a less acute shadow-leverage penalty than in core financialized markets.

The Middle Tier (New Tier 1 and Tier 2)—as the baseline group—sits in a "valley" where explicit-credit advantages are weaker than in Tier 1 and policy-buffer effects are weaker than in Tier 4+. Combined with historically higher LGFV reliance in many mid-tier cities, this configuration leaves the middle tier most exposed to downside pressures when implicit deleveraging coincides with weakening land revenues and tightening liquidity.

6. Mechanisms: Supply Adjustment and Liquidity Stratification

Section 5 established that fiscal–financial exposure—especially implicit debt risks around LGFVs—constrains housing-market resilience during the downturn. This section asks *through which channels* that constraint manifests. A natural hypothesis is the land market: local governments adjust listed land supply under fiscal incentives, and those adjustments may shape market liquidity. As we show, the evidence for a systematic fiscal → supply linkage is **mixed** across tiers; however, the evidence on **liquidity stratification and persistence** is strong and provides a clear micro-foundation for the barbell pattern.

Throughout, we adopt a tiered political-economy lens. Tier 1 stability is primarily demand-driven. The middle tier (New Tier 1 and Tier 2) is more prone to a fiscal–financial liquidity trap. The bottom tier (Tier 3/4+) differs mainly through a quantity-adjustment regime with weaker persistence of liquidity frictions, rather than superior fundamentals.

6.1 Land Supply and Inventory Dynamics

To characterize local supply conditions, we construct an inventory pressure index defined as the ratio of listed land to land actually sold.

Figure 10 decomposes these dynamics into the administrative "action" (listed supply vs. sold demand, Panel A) and the market "outcome" (inventory pressure ratio, Panel B).

Three features stand out. First, Tier 1 cities exhibit the most favorable trajectory, with inventory pressure steadily declining—consistent with strong absorption capacity. Second, the middle tier shows a "high-pressure trap": demand collapses sharply, and inventory pressure remains elevated even as listings decline, implying that supply retrenchment was insufficient relative to the scale of demand collapse. Third, the bottom tier (Tier 3/4+) remains elevated in pressure but shows some improvement after 2021; Panel A indicates sizeable quantity responses in listings during the downturn. These patterns motivate a more formal examination of how fiscal incentives correlate with supply adjustment.

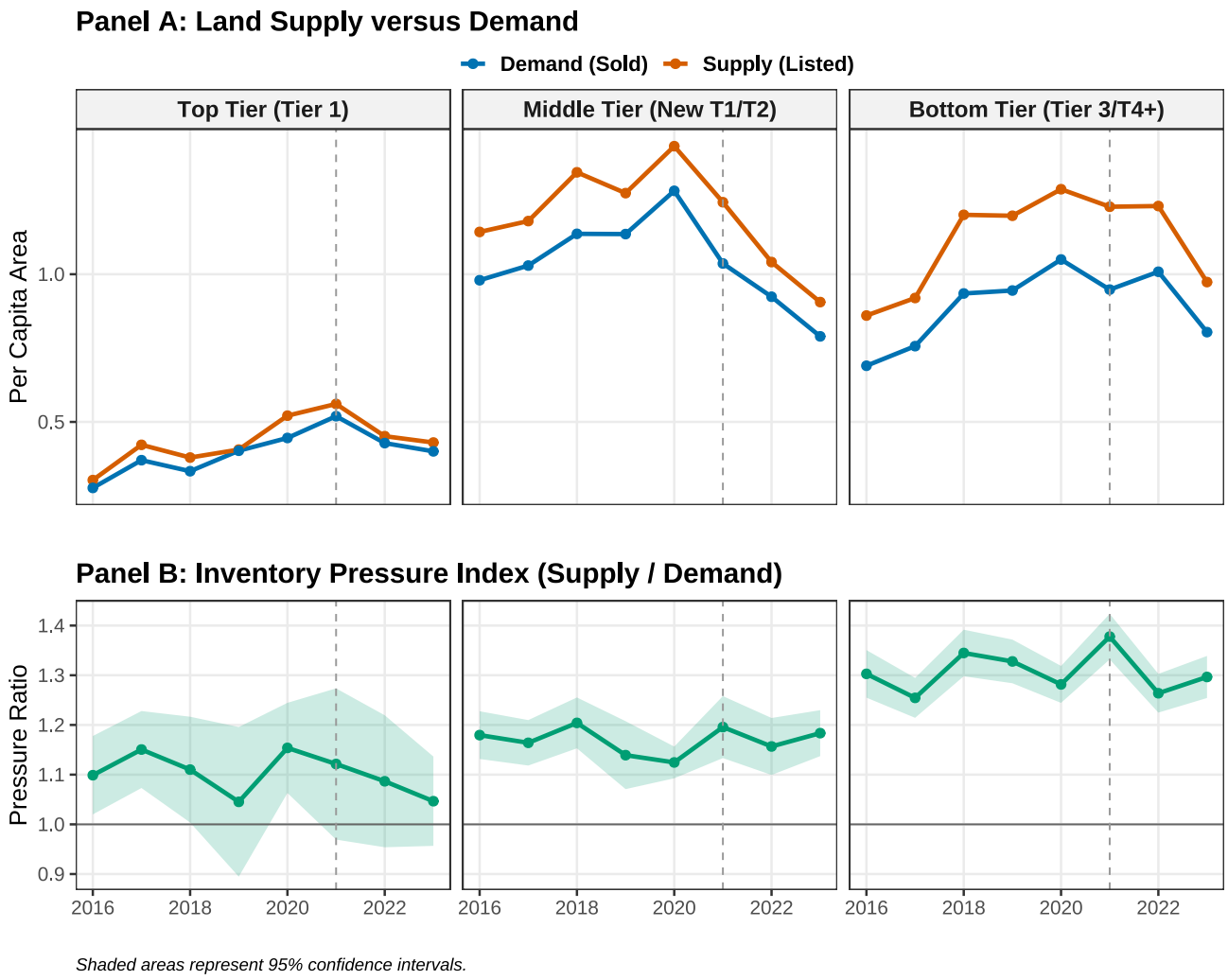

Figure 10: Land supply and inventory dynamics (2016–2023). Panel A displays per-capita listed land (supply) versus sold land (demand). Panel B shows the inventory pressure ratio (Supply/Demand). Shaded areas represent 95% confidence intervals.

6.2 Fiscal Incentives and Supply Adjustment (Mechanism)

We test whether fiscal–financial conditions shape supply behavior using two-way fixed-effects panel regressions with the annual change in per-capita listed land supply as the dependent variable.The dependent variable is the annual change in per-capita listed land supply.

All fiscal variables enter lagged and are interacted with a downturn indicator (Bust = 1 for 2022 onward). Standard errors are clustered at the city level. Results are reported separately for the middle tier and the bottom tier (Tier 3/4+).

Table 7: Fiscal incentives and land supply adjustment (Dependent variable: $\Delta Supply$).

	Middle Tier Cities (New Tier 1/Tier 2)				**Bottom Tier Cities (Tier 3/4+)**			
	Land Fee	LGFV Debt	Gen Bond	Spec Bond	Land Fee	LGFV Debt	Gen Bond	Spec Bond
Land supply level (t-1)	-0.613***	-0.622***	-0.564***	-0.567***	-0.566***	-0.564***	-0.545***	-0.539***
	(0.084)	(0.080)	(0.084)	(0.081)	(0.081)	(0.073)	(0.071)	(0.071)
Price growth (t-1)	0.718*	0.693	0.722	0.698	0.075	-0.057	-0.053	-0.079
	(0.425)	(0.420)	(0.446)	(0.437)	(0.254)	(0.249)	(0.258)	(0.255)
Fiscal variable (t-1)	0.171	0.597***	0.171	0.775	0.185**	0.349**	-0.361	-0.004
	(0.162)	(0.224)	(0.834)	(0.971)	(0.080)	(0.154)	(0.500)	(0.681)
Fiscal × Bust	0.240	-0.174	-0.462	-0.822	-0.129	-0.163	-0.325	-0.531
	(0.164)	(0.171)	(0.362)	(0.704)	(0.094)	(0.176)	(0.365)	(0.715)
Num. Obs.	243	262	262	262	740	857	857	857
R^2	0.297	0.300	0.268	0.273	0.267	0.271	0.265	0.263
RMSE	0.40	0.40	0.41	0.41	0.50	0.51	0.51	0.51

Notes. Two-way fixed effects (city and year). The dependent variable is the annual change in per-capita listed land supply ($\Delta Supply$), defined as $\Delta Supply_{it} = Supply_{it} - Supply_{i,t-1}$. Bust equals 1 for 2022 onward. "Fiscal variable (t-1)" refers to the fiscal measure named in each column header; "Fiscal × Bust" is its interaction with Bust. We report Wald tests for the downturn-period total fiscal effect ($\beta + \delta = 0$): Middle tier—Land Fee $p = 0.004$, LGFV $p = 0.171$, Gen Bond $p = 0.207$, Spec Bond $p = 0.350$; Bottom tier (Tier 3/4+)—Land Fee $p = 0.794$, LGFV $p = 0.536$, Gen Bond $p = 0.112$, Spec Bond $p = 0.296$. Standard errors are clustered at the city level. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Two patterns are robust. First, supply adjustment exhibits strong mean reversion across tiers: higher lagged supply levels predict subsequent contraction, consistent with administrative correction after earlier expansion. In the middle tier, lagged price growth is also positively associated with supply expansion, consistent with standard market responsiveness to price signals. Second, the estimated interaction coefficients (Fiscal $\times$ Bust) are not uniformly precisely estimated in every specification. To interpret downturn behavior transparently, we therefore evaluate the downturn-period total fiscal effect as the marginal effect when Bust = 1, i.e., the sum of the baseline fiscal coefficient and its interaction term ($\beta + \delta$), and report Wald tests for $\beta + \delta = 0$.

The total-effect results sharpen the interpretation. For the middle tier, the Wald test rejects zero for land-fee dependence ($p = 0.004$), while the total effects for LGFV debt, general bonds, and special bonds are not statistically significant ($p = 0.171$, 0.207, and 0.350, respectively). In plain terms, conditional on fundamentals and fixed effects, cities that are more dependent on land-fee revenue tend to cut supply less aggressively during the downturn, consistent with revenue-facing constraints on retrenchment. For the bottom tier (Tier 3/4+), the corresponding total-effect tests are not significant across fiscal measures (Land Fee $p = 0.794$, LGFV $p = 0.536$, Gen Bond $p = 0.112$, Spec Bond \$p=0.296), suggesting that fiscal incentives do not translate into a stable and systematic supply-response pattern in this group.

Importantly, these results do not imply that middle-tier governments "did not cut supply." Figure 10 (Panel A) shows that they did cut listings. The point is that retrenchment appears constrained and ultimately insufficient relative to the magnitude of the demand collapse, leaving the middle tier in a high-pressure equilibrium.

Interpretation note. Because the fiscal level term and its Bust interaction are often highly correlated, individual coefficients can appear imprecise even when the marginal effect evaluated at Bust = 1 is well identified. This is why we prioritize the total effect ($\beta + \delta$) and test it using the full cluster-robust covariance matrix.

6.3 Liquidity Stratification: DOM and Stale Accumulation

Does quantity adjustment translate into market functioning, or does it coincide with persistent illiquidity? Figure 11 plots the smoothed dynamics of median Days on Market (DOM). The post-2021 divergence is stark: the middle tier experiences the most severe liquidity compression, consistent with the macro "barbell" pattern extending from prices to market functioning.

DOM captures transaction speed, but it does not directly quantify whether illiquidity accumulates as persistent "stale" inventory. We define stale share as the proportion of listings that remain unsold beyond 1 year. We therefore turn to a city-level panel of annual stale share and estimate two-way fixed-effects regressions that include (i) the lagged stale share, (ii) lagged supply levels and lagged supply adjustment, and (iii) fiscal variables (and their Bust interactions), alongside fundamentals. Table 8 reports the results.

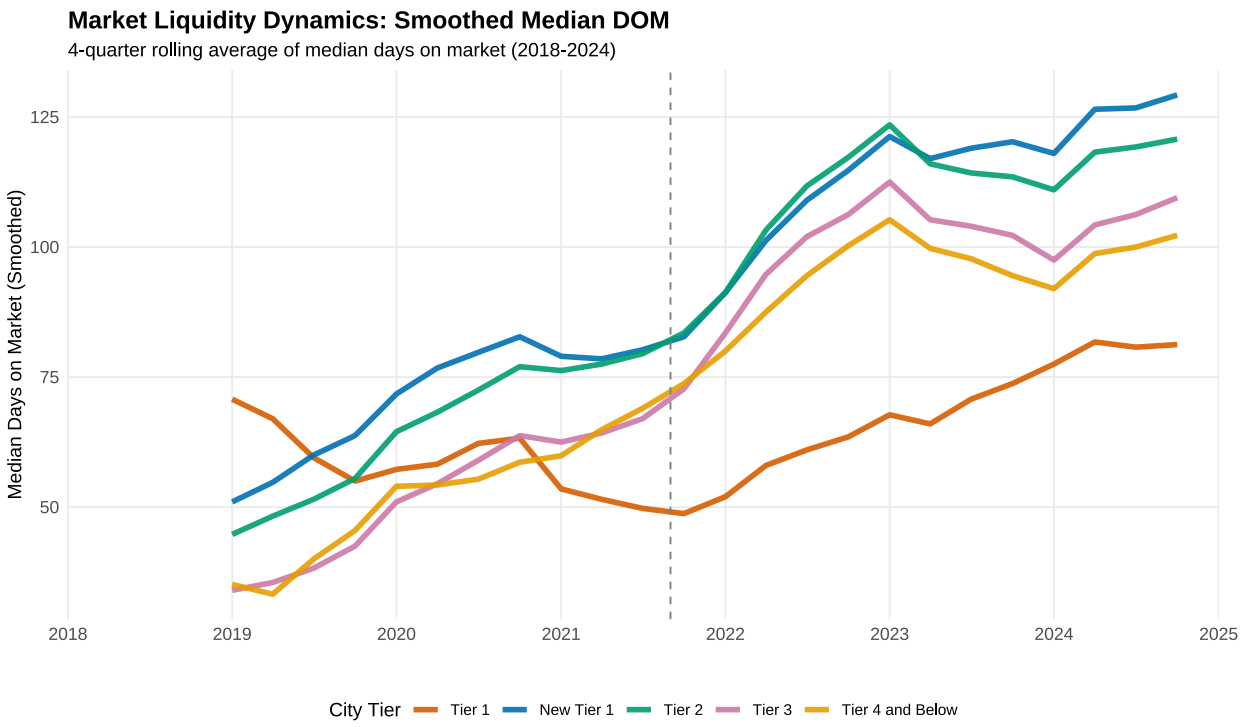

Figure 11: Liquidity stratification across the urban hierarchy. The chart displays the smoothed median Days on Market (DOM). Post-2021, liquidity dynamics diverge into a "liquidity barbell," with the middle tier experiencing the most severe freezing.

Table 8: Liquidity frictions and stale accumulation (Dependent variable: stale share).

	Middle Tier Cities (New Tier 1/Tier 2)				**Bottom Tier Cities (Tier 3/4+)**			
	Land Fee	LGFV Debt	Gen Bond	Spec Bond	Land Fee	LGFV Debt	Gen Bond	Spec Bond
Outcome (t-1)	0.397***	0.475***	0.453***	0.448***	0.214**	0.217**	0.188**	0.187**
	(0.083)	(0.055)	(0.056)	(0.057)	(0.106)	(0.096)	(0.093)	(0.092)
Land supply level (t-1)	0.013***	0.013***	0.011**	0.011**	-0.011*	-0.008	-0.009	-0.009
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)
Price growth (t-1)	-0.115***	-0.080***	-0.093***	-0.092***	-0.020	-0.034	-0.051	-0.049
	(0.034)	(0.021)	(0.021)	(0.020)	(0.032)	(0.031)	(0.032)	(0.032)
ΔSupply (t-1)	-0.009	-0.008	-0.006	-0.006	0.007	0.006	0.005	0.005
	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)
ΔSupply $\times$ Bust	-0.004	-0.006	-0.007	-0.007	-0.002	-0.002	-0.001	0.000
	(0.009)	(0.007)	(0.007)	(0.007)	(0.005)	(0.005)	(0.004)	(0.004)
Fiscal variable (t-1)	-0.027***	-0.036	0.001	-0.006	0.014	-0.026*	-0.020	-0.049
	(0.010)	(0.024)	(0.087)	(0.104)	(0.009)	(0.014)	(0.069)	(0.117)
Fiscal $\times$ Bust	0.021**	0.025**	-0.018	-0.045	0.001	0.022	-0.017	-0.029
	(0.010)	(0.012)	(0.023)	(0.030)	(0.007)	(0.014)	(0.053)	(0.094)
Num. Obs.	244	263	263	263	227	259	258	258
R^2	0.409	0.372	0.359	0.362	0.109	0.082	0.077	0.080
RMSE	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02

Notes. Two-way fixed effects (city and year). The dependent variable is the annual stale share. Bust equals 1 for 2022 onward. "Fiscal variable (t-1)" refers to the fiscal measure named in each column header; "Fiscal $\times$ Bust" is its interaction. We report Wald tests for the total marginal effect of lagged supply adjustment during the downturn ($H_0 : \beta + \delta = 0$), where β and δ are the coefficients on $\Delta Supply(t-1)$ and its interaction, respectively. The resulting p-values indicate significant reactive adjustment in the Middle tier (Land Fee $p = 0.012$, LGFV $p = 0.002$, Gen Bond $p = 0.005$, Spec Bond $p = 0.005$) but not in the Bottom tier (Land Fee $p = 0.198$, LGFV $p = 0.229$, Gen Bond $p = 0.173$, Spec Bond $p = 0.154$). Standard errors are clustered at the city level. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

The central result is persistence. The middle tier exhibits a much larger and highly significant autoregressive coefficient in stale accumulation (approximately 0.40–0.48), nearly double the bottom-tier estimate (approximately 0.19–0.22). This indicates that the middle tier is more prone to a self-reinforcing liquidity trap: once stale inventory accumulates, it tends to persist and amplify.

We then test whether supply adjustment is systematically linked to stale dynamics during the downturn by evaluating the marginal effect of lagged supply adjustment at Bust = 1, $ME_{\text{Bust}} = \beta_{\Delta S} + \delta_{\Delta S}$, where $\beta_{\Delta S}$ loads on $\Delta\text{Supply}_{t-1}$ and $\delta_{\Delta S}$ on $\Delta\text{Supply}_{t-1} \times \text{Bust}$. Wald tests reject $ME_{\text{Bust}} = 0$ for the middle tier across specifications (Land Fee $p = 0.012$, LGFV $p = 0.002$, Gen Bond $p = 0.005$, Spec Bond $p = 0.005$), but not for the bottom tier (Land Fee $p = 0.198$, LGFV $p = 0.229$, Gen Bond $p = 0.173$, Spec Bond $p = 0.154$). Because $\Delta\text{Supply}_{t-1}$ and its interaction are often highly collinear, individual coefficients may appear imprecise even when the linear combination is well identified under the full cluster-robust variance–covariance matrix.

Finally, the sign of the downturn marginal effect in the middle tier suggests a reactive pattern. Point estimates for both $\beta_{\Delta S}$ and $\delta_{\Delta S}$ are negative (Table 2); since ΔSupply is typically negative during the downturn, stronger contraction is associated with *higher* stale share. This is consistent with distress-driven retrenchment that arrives after liquidity deterioration has begun, rather than a policy-controlled clearing mechanism.[1]

6.4 Discussion: What This Section Adds

This section contributes two pieces of evidence that extend the barbell effect from prices to market functioning.

First, we document a pronounced liquidity stratification: the middle tier suffers not only larger price corrections but also the most persistent illiquidity, as shown in both DOM dynamics and (more importantly) the accumulation of stale inventory.

Second, we show that this illiquidity is path-dependent. The much larger lagged stale coefficient in the middle tier (≈0.40–0.48 vs. ≈0.19–0.22 in Tier 3/4+) indicates a self-reinforcing trap once distress begins—precisely the mechanism consistent with a "high-pressure equilibrium" where inventories and liquidity constraints feed on one another.

While the direct fiscal → supply linkage is mixed—significant for middle-tier land-fee dependence but not robust across other fiscal measures or for the bottom tier—the liquidity evidence suggests that fiscal–financial exposure operates through a different mechanism: it constrains the market's ability to clear accumulated inventory once shocks arrive, producing persistence and freezing in the middle tier. By contrast, Tier 3/4+ cities exhibit weaker persistence in stale accumulation and weaker coupling between downturn supply adjustments and stale outcomes, consistent with a different adjustment regime in which quantity correction and clearing dominate and illiquidity is less likely to become self-reinforcing.

[1] Because these regressions include a lagged dependent variable with two-way fixed effects and a relatively short time dimension, coefficients should be interpreted as conditional associations rather than strict causal effects; supply adjustment is plausibly endogenous to liquidity conditions.

Table 9: Comparison of Housing Price Changes by City Tiers

	Peak to 2024 Change (%)		2022 to 2024 Change (%)		Num of cities	
City Category	Our data	Official data	Our data	Official data	Our data	Official data
By Tier						
Tier 1	-17.2	-12.8	-8.60	-9.35	4	4
New Tier 1	-25.8	-15.2	-19.00	-12.5	15	13
Tier 2	-26.6	-19.9	-20.40	-17.0	30	20
Tier 3	-22.1	-17.8	-14.80	-15.1	65	20
Tier 4 and Below	-15.1	-21.0	-7.42	-16.9	189	13
By Region						
Central	-19.9	-18.1	-12.50	-15.4	82	16
East	-25.2	-17.8	-16.70	-15.1	91	28
Northeast	-16.9	-24.3	-10.10	-19.6	33	8
West	-12.3	-16.4	-5.29	-12.9	97	18

7. Robustness check

7.1 Comparison with Official Statistics

To validate the reliability of our core findings, I conducted two alternative tests. First, Table 9 compares our dataset with the official National Bureau of Statistics 70-city housing price indices. Despite some numerical differences, both datasets capture similar market adjustment patterns: Tier 1 and Tier 4+ cities demonstrate greater resilience (the "barbell effect"), and Eastern regions experience larger corrections than Western regions. This consistency confirms that our data source reliably reflects the spatially differentiated characteristics of China's real estate market.

7.2 Validation with Transaction-Based Micro-Data

A potential concern with using listing price data (Anjuke) is the issue of price rigidity or "stickiness" during market downturns, where sellers may be reluctant to lower asking prices despite declining market values. To address this, we constructed a transaction-based housing price index using micro-level transaction records from Beike (Ke Holdings), covering a sub-sample of 110 major cities. This allows for a direct "head-to-head" comparison between listing expectations and realized market clearing prices across different market phases.

Table 10 reports the comparative regression results. Columns (1) and (2) compare the effects during the Adjustment Phase (2022-2024), while Columns (3) and (4) examine the Boom Phase (2016-2021).

The results from the transaction-based model strongly reinforce our core hypothesis of a phase-dependent fiscal-property nexus, providing two critical insights that extend beyond the baseline model:

First, the LGFV debt variable exhibits a striking structural reversal that validates our mechanism. In the Adjustment Phase (Columns 1-2), implicit debt exerts a significant negative effect on transaction prices ($\beta = -0.039, p < 0.01$). The magnitude is remarkably similar to the listing price model ($\beta = -0.044$), confirming that the "fiscal burden" effect is a structural reality, not an artifact of listing

Table 10: Robustness Check: Listing vs. Transaction Prices Across Market Phases

	Adjustment Phase (2022-2024)		Boom Phase (2016-2021)	
	Listing	Transaction	Listing	Transaction
Price Change (t-1)	0.449^{***}	0.280^{***}	0.131^{*}	0.104
	(0.079)	(0.060)	(0.076)	(0.074)
General Bond/GDP (t-1)	-0.058	-0.156	-0.115	0.133
	(0.117)	(0.102)	(0.129)	(0.134)
Special Bond/GDP (t-1)	-0.103	0.118	0.249	-0.095
	(0.152)	(0.132)	(0.179)	(0.183)
LGFV Bond/GDP (t-1)	-0.044^{***}	-0.039^{***}	0.001	0.028
	(0.015)	(0.013)	(0.022)	(0.023)
Land Revenue/Fiscal Revenue (t-1)	0.027^{**}	0.016^{*}	-0.014	-0.019
	(0.010)	(0.009)	(0.013)	(0.013)
Controls	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
R^2	0.398	0.331	0.075	0.082
Num. obs.	294	294	259	259

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

price measurement. Conversely, in the Boom Phase (Columns 3-4), the coefficient for LGFV debt in the transaction model turns positive (0.028), contrasting sharply with the adjustment phase. This polarity—from a growth catalyst (or neutral factor) to a significant drag—proves that implicit debt transforms into a binding constraint on housing resilience only when the market cycle turns.

Second, the Land Finance variable reveals a nuanced mechanism of "price-volume divergence." During the adjustment phase, while land revenue dependency significantly supports listing prices ($\beta = 0.027^{**}$), its support for realized transaction prices is weaker and less significant ($\beta = 0.016^{*}$). This discrepancy suggests that while local governments' supply restriction strategies effectively bolster price expectations (listings), their ability to support actual clearing prices (transactions) is partially constrained by drying market liquidity. In other words, supply constraints can maintain high asking prices, but they cannot fully prevent the valuation correction in realized transactions.

7.3 Alternative Periodization

Given the variation in housing price peak timing across cities, I used 2021 (rather than 2022) as the market phase demarcation point for robustness testing. The phase-specific regression results in Table 11 remain highly consistent with our primary analysis: general bond balance shows a significant positive correlation during the adjustment period (2021-2024), special bond balance exhibits a significant negative correlation during the boom period (2015-2020) but becomes insignificant during adjustment, and fiscal self-sufficiency ratio and land transfer revenue demonstrate significant positive correlations during the adjustment period. These results confirm the structural transformation in fiscal-housing price relationships across market phases.

Table 11: Robustness Check with Alternative Market Phase Demarcation (2021)

	Boom Phase (2015-2020)	Adjustment Phase (2021-2024)
Price Change (t-1)	0.08^{**}	0.39^{***}
	(0.04)	(0.04)
General Bond/GDP (t-1)	-0.05	0.06^{**}
	(0.07)	(0.03)
Special Bond/GDP (t-1)	0.02	-0.24^{***}
	(0.17)	(0.05)
LGFV Bond/GDP (t-1)	-0.00	-0.02^{**}
	(0.03)	(0.01)
Land Revenue/Fiscal Revenue (t-1)	-0.08^{***}	0.03^{***}
	(0.01)	(0.00)
Fiscal Self-Sufficiency (t-1)	0.08^{**}	0.01
	(0.03)	(0.02)
Unutilized Debt Capacity (t-1)	0.12	0.29^{***}
	(0.09)	(0.05)
Controls	Yes	Yes
City Fixed Effects	Yes	Yes
Time Fixed Effects	Yes	Yes
R^2	0.22	0.31
Num. obs.	556	983

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

To provide a comprehensive validation of our findings across different market phases, we conduct cross-sectional analyses for both boom (2017-2021) and bust (2021-2024) periods. Using predetermined fiscal variables to predict subsequent housing price performance.

Table 12 presents the comparative results across market phases. The findings reveal striking phase-dependent transformations in fiscal-housing relationships, strongly supporting our panel regression results. Several key patterns emerge:

General bond balance demonstrates consistently positive effects across both periods, but with dramatically different magnitudes. During the boom period, general bonds show a strong positive effect, while during the bust period, the effect becomes much smaller but remains significant. This suggests that general bonds serve as growth facilitators during expansions and stabilization tools during contractions, validating our "counter-cyclical transformation" hypothesis.

Land finance dependency shows persistent negative effects but with varying significance patterns. During the boom period, land revenue dependence demonstrates a marginally significant negative effect , while during the bust period, this effect becomes highly significant. This pattern indicates that land finance dependency creates structural vulnerabilities that become more pronounced during market stress.

Regional effects exhibit clear phase-dependent patterns. Eastern regions show significant positive effects during the boom period but neutral effects during the bust period, suggesting that regional advantages in market expansion do not translate to resilience during corrections.

The cross-sectional validation particularly strengthens the interpretation of our results by demonstrating that predetermined fiscal structures can effectively predict subsequent housing market performance across different phases. The contrasting coefficient magnitudes and significance patterns across boom

Table 12: Cross-sectional Analysis: Boom vs. Bust Period Comparison

	Boom Period (2015.04-2021.09)	Bust Period (2021.09-2024.12)
General Bond Balance/GDP	2.193**	0.162*
	(1.025)	(0.088)
Special Bond Balance/GDP	-1.724	-0.021
	(1.430)	(0.112)
Fiscal Self-Sufficiency Rate	-0.506	-0.016
	(0.514)	(0.044)
Unutilized Debt Capacity	1.953*	-0.038
	(1.046)	(0.145)
Land Revenue/GDP	-4.649*	-0.718***
	(2.792)	(0.214)
LGFV Debt Balance/GDP	0.090	-0.019
	(0.372)	(0.030)
City Tier FE	Yes	Yes
Region FE	Yes	Yes
Economic Controls	Yes	Yes
Observations	168	256
R-squared	0.173	0.326
F-statistic	1.534	6.762

Note: Robust standard errors in parentheses. Economic controls include GDP growth rate, tertiary industry ratio, population growth, and housing price-income ratio. Boom period uses 2017 fiscal variables due to data availability.
* p < 0.1, ** p < 0.05, *** p < 0.01

and bust periods provide compelling evidence for the phase-dependent fiscal-property nexus identified in our panel analysis.

The mediation analysis with alternative periodization in Table 13 further validates the functional transformation of land supply. During 2015-2020, land transfer revenue positively correlates with land supply , and land supply positively affects housing price growth; during 2021-2024, general bond and special bond balances show significant negative correlations with land supply, while land supply's effect on housing prices becomes negative though insignificant. This shift confirms the functional transformation of land supply across market phases: from an expansionary tool during boom periods to a price stabilization instrument during adjustments.

Collectively, these robustness checks strengthen our core findings, confirming that the impact of fiscal structures on housing price resilience undergoes a structural transformation across different market phases, regardless of specific data sources or periodization methods.

Table 13: Robustness Check Mediation with Alternative Market Phase Demarcation (2021)

	2015-2020			2021-2024		
	Total	Path A	Direct	Total	Path A	Direct
House Price Change Rate (t-1)	0.104^{***}	0.393^{***}	0.071^{**}	0.254^{***}	-0.356	0.178^{***}
	(0.030)	(0.150)	(0.036)	(0.035)	(0.501)	(0.043)
General Bond Balance/GDP (t-1)	0.024	0.432	-0.132	0.401^{***}	-4.043^{*}	0.136
	(0.131)	(0.369)	(0.163)	(0.117)	(2.159)	(0.186)
Special Bond Balance/GDP (t-1)	-0.357^{***}	-0.151	-0.454^{***}	0.118	-2.574^{*}	0.150
	(0.108)	(0.476)	(0.149)	(0.083)	(1.457)	(0.126)
Fiscal Self-Sufficiency Rate (t-1)	0.106^{*}	-0.064	0.105	0.125^{***}	0.000	0.150^{***}
	(0.060)	(0.165)	(0.079)	(0.047)	(0.638)	(0.055)
Unutilized Debt Capacity(t-1)	0.141^{**}	0.337	0.142	0.108^{**}	-1.141	0.031
	(0.071)	(0.363)	(0.100)	(0.052)	(0.841)	(0.072)
Land Revenue/GDP (t-1)	0.040	2.238^{***}	-0.037	0.292^{**}	-0.573	0.307^{**}
	(0.171)	(0.801)	(0.222)	(0.114)	(1.529)	(0.131)
LGFV Bond Balance/GDP (t-1)	0.061	0.027	0.046	-0.028	0.072	0.004
	(0.040)	(0.139)	(0.056)	(0.018)	(0.275)	(0.024)
GDP Growth Rate (t-1)	0.246^{*}	-0.457	0.429^{*}	0.107	-0.723	0.092
	(0.139)	(0.755)	(0.231)	(0.073)	(0.971)	(0.083)
Tertiary Industry Ratio (t-1)	0.246^{**}	-0.631	0.299^{**}	-0.193^{*}	-0.329	0.021
	(0.098)	(0.434)	(0.124)	(0.106)	(1.873)	(0.161)
Population Growth Rate (t-1)	0.013	-0.290	0.086	0.063^{*}	0.199	0.048
	(0.050)	(0.262)	(0.067)	(0.037)	(0.571)	(0.049)
Housing Price-Income Ratio (t-1)	-1.050^{***}	-0.406	-1.057^{***}	-1.674^{***}	3.955^{*}	-1.961^{***}
	(0.080)	(0.318)	(0.095)	(0.125)	(2.014)	(0.174)
Land Supply Population Ratio (t)			0.031^{***}			-0.004
			(0.010)			(0.004)
City Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.248	0.040	0.272	0.297	0.042	0.305
Adj. R^2	0.011	-0.317	-0.037	0.032	-0.497	-0.089
Num. obs.	898	783	698	780	593	593

$^{***}p < 0.01; ^{**}p < 0.05; ^{*}p < 0.1$

8. Conclusion

This study makes significant contributions to understanding China's real estate market by systematically analyzing housing price resilience during the unprecedented post-2021 market adjustment. Through a comprehensive dataset covering over 300 Chinese cities from 2015-2024, I examine the fiscal-property resilience nexus that reveals how local government fiscal structures fundamentally shape housing market outcomes.

Our research introduces several key innovations to the fiscal geography and urban development literature.

First, we document a fundamental functional transformation of fiscal instruments across market cycles. By precisely differentiating between general bonds, special-purpose bonds, and LGFV debt, we identify distinct impact pathways. Contrary to previous studies suggesting that implicit debt acts as a growth catalyst, our findings reveal that **LGFV debt is a "fair-weather friend"**—statistically insignificant during booms but transforming into a binding **"fiscal burden"** that significantly constrains intervention capacity during corrections. Conversely, **General Bonds** exhibit an **"awakening effect"**, functioning as a dormant factor during expansions but emerging as a critical **"crisis stabilizer"** during downturns. This underscores that the market valuation of government credit is highly state-dependent, with explicit sovereign backing becoming the decisive anchor for expectations only when private liquidity retreats.

Second, we provide a fiscal-institutional explanation for the "barbell effect" in housing price resilience. We show that the stability of **Tier 1 cities** stems from a unique **"hyper-sensitivity"** to explicit state credit, where markets price in strong sovereign backing despite high valuations. In contrast, **Tier 4+ cities** exhibit resilience driven by a **"subsidy effect"** from broad-based fiscal support. The vulnerability of **mid-tier cities (New Tier 1 and Tier 2)** is thus explained by a **"structural mismatch"**: they rely heavily on implicit debt (LGFV) which becomes toxic during deleveraging, yet they lack the protective sensitivity to explicit credit enjoyed by top-tier metropolises. This leaves the middle tier in a "valley of ineffectiveness," facing the deepest corrections.

Third, our mechanism analysis reveals that fiscal constraints manifest through "liquidity stratification" rather than just price adjustments. We find that fiscal stress does not merely lower prices but freezes market functioning. Cities with higher implicit debt burdens experience more severe **liquidity traps**, characterized by a self-reinforcing accumulation of stale inventory. This suggests that the "fiscal-property nexus" operates by constraining the market's ability to clear distress, creating path-dependent illiquidity in fiscally vulnerable regions.

These findings offer crucial policy implications. The "one-size-fits-all" approach to market stabilization is likely insufficient given the divergent fiscal mechanisms we identified. * **For Tier 1 cities**, the priority is managing the "shadow risk" of implicit leverage, as their markets are highly sensitive to the quality of government balance sheets. * **For the vulnerable Middle Tier**, standard stimulus may be ineffective due to the "liquidity trap." Policy interventions here must address the implicit debt overhang directly to restore local fiscal capacity before market confidence can recover. * **For General Policy**, the results argue for a continued shift towards **explicit fiscal channels (General Bonds)** as the primary tool for counter-cyclical management, as these instruments have proven effective in stabilizing expectations during crises, whereas implicit financing vehicles exacerbate downward volatility.

Despite these contributions, our study has limitations. The adjustment period (2022-2024) is relatively short, and future research should explore how these fiscal-property relationships evolve as the debt

resolution process matures. Additionally, intra-urban analyses could further reveal how fiscal pressures create spatially uneven development patterns within cities. Nevertheless, this research provides a robust framework for understanding the non-equilibrium adjustments in China's real estate market, demonstrating that in the post-boom era, the resilience of urban asset prices is inextricably linked to the structural health of local public finance.

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