

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 366 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 neutral instruments during boom periods to critical counter-cyclical stabilization tools during market corrections, while Local Government Financing Vehicle (LGFV) debt converts from a growth catalyst to a fiscal burden constraining government intervention capacity. Third, land supply transforms from a growth-oriented revenue-generating tool during boom periods to a strategic market stabilization instrument during corrections, with high land-finance dependent cities shifting toward supply restriction to maintain price levels. The granular decomposition of local government fiscal indicators reveals heterogeneous effects of different debt types on housing price resilience across regions and urban hierarchies, advancing theoretical understanding of how state fiscal structures mediate market dynamics during non-equilibrium adjustments. 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](#)), I 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, I 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 2023](#)), 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, I 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 366 Chinese cities from 2015 to 2024 and employing panel regression models with fixed effects, I 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, I 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, I reveal that different fiscal instruments operate through distinct phase-dependent mechanisms: general bonds transform from neutral instruments during boom periods to critical counter-cyclical stabilization tools during market corrections, while LGFV debt converts from a growth catalyst to a fiscal burden that constrains government intervention capacity. Third, our mediation analysis demonstrates that land supply transforms from a growth-oriented revenue-generating tool during boom periods to a strategic market stabilization instrument during corrections, with high land-finance dependent cities shifting toward supply restriction to maintain price levels.

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 2023](#); [Pan et al. 2017](#)), I 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 legitimization 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 “back-door” 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 directly reduce land transfer revenues, 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. 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 (2023)).

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 (2023) 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 central 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 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.

3. Empirical framework

3.1 Research Data and Sample Selection

Our study examines the relationship between fiscal structures and housing price dynamics across Chinese cities during both market expansion and contraction phases. I employ a comprehensive dataset covering 366 Chinese cities from 2015 to 2024, with housing price data primarily sourced from monthly average second-hand housing prices collected from Anjuke, one of China's leading real estate platforms renowned for its extensive market coverage and data reliability. This dataset provides excellent geographical coverage across prefecture-level cities, provincial capitals, municipalities directly under the Central Government, autonomous prefectures, and various special administrative regions, offering consistent measurement that enables robust analysis of spatial differentiation in housing price resilience. I supplement this primary data with the National Bureau of Statistics' 70-city housing price indices as a secondary reference point, particularly for validating trends in major urban centers.

The core fiscal and economic data are integrated from multiple sources. Local government fiscal indicators including general bonds, special bonds, and LGFV debt figures are compiled from the Enterprise Warning Database (qiye yujing tong in Chinese), which systematically tracks local government 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 databases. This integrated dataset enables us to examine the complex interplay between fiscal structures and housing market performance across varied urban contexts and market phases.

For analytical purposes, I divide the sample into two distinct periods: 2015-2021 representing the market expansion phase and 2022-2024 capturing the subsequent adjustment phase. This periodization reflects the empirical reality that most Chinese cities reached their housing price peaks between mid-2021 and early 2022, with specific timing varying across the urban hierarchy. By comparing these periods, I can identify structural changes in the fiscal-housing relationship across market phases.

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:

$$y_t = x'_t \beta_j + u_t, \quad t = T_{j-1} + 1, \dots, T_j$$

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

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

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. I 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 GDP 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, I 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 Land Supply Role Analysis

I analyze how land supply mediates the relationship between fiscal structures and housing prices across market phases. Our investigation examines whether land supply functions as a mediator transmitting fiscal influences to housing markets, or as a suppressor variable that enhances these relationships, with focus on transformations between market expansion and contraction.

I follow Baron and Kenny (1986) ‘s three-step procedure: first assessing the total effect of fiscal variables on housing prices; then analyzing fiscal variables’ influence on land supply; and finally examining the direct effect of fiscal variables on housing prices while controlling for land supply. By comparing coefficient changes between total and direct effects, I identify whether land supply acts as a mediator (coefficients decrease) or exhibits suppression effects (coefficients increase or change sign).

I conduct identical analyses for both the expansion period (2015-2021) and adjustment period (2022-2024) to compare land supply’s evolving function. This approach allows us to determine whether land supply transforms from a strategic market tool during booms to a fiscal pressure transmission channel during corrections.

This framework examines both direct and indirect pathways through which fiscal structures affect housing price resilience, particularly how these pathways reconfigure during market transitions. Our approach recognizes land supply’s dynamic role within China’s fiscal-property nexus, providing an institutional explanation for spatially differentiated housing price corrections.

3.5 Robustness Tests

To ensure the reliability of our findings, I conduct two main robustness checks. First, I employ alternative periodization using 2021 as the cutoff between boom and adjustment periods to account for varying peak timing across the urban hierarchy. This addresses the observation that many higher-tier cities reached their price peaks earlier than the January 2022 baseline used in our primary analysis. Second, I compare our dataset with the official National Bureau of Statistics 70-city housing price indices to validate the

spatial patterns of market adjustment. While the limited sample size of the official data precludes its use in regression analysis, it serves as an important reference point for verifying the observed patterns of housing price corrections across different city tiers and regions. This comparison confirms that both datasets capture similar spatial differentiation in market resilience, with the “barbell effect” across the urban hierarchy and regional variations in price corrections.

These robustness checks confirm that our core findings regarding the transformation of fiscal-housing relationships across market phases remain consistent regardless of periodization choices or data sources, 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 1 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.

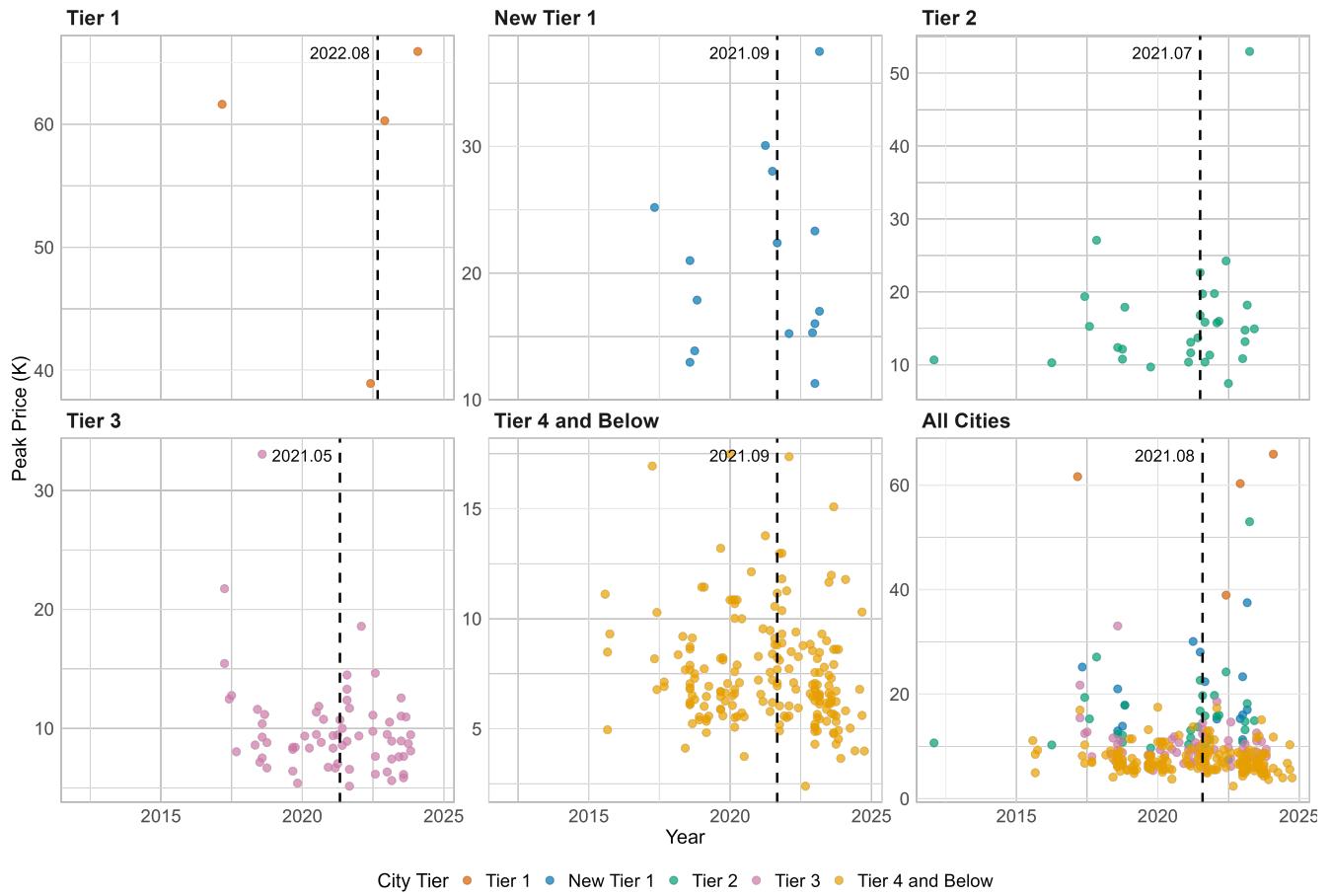


Figure 1: Housing Price Changes by City Tier and Region (Peak-to-2024 and 2022-2024)

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 2).

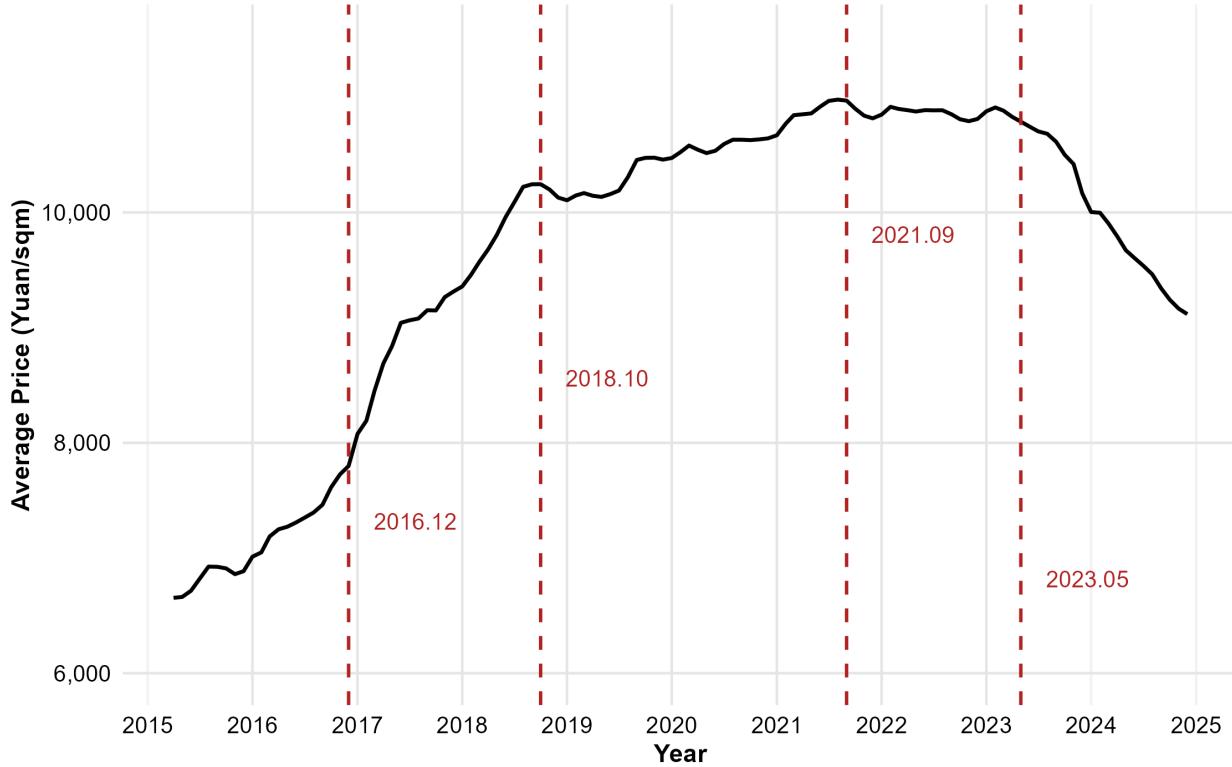


Figure 2: Structural Breakpoints in China’s Housing Market Prices, 2015-2025

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.

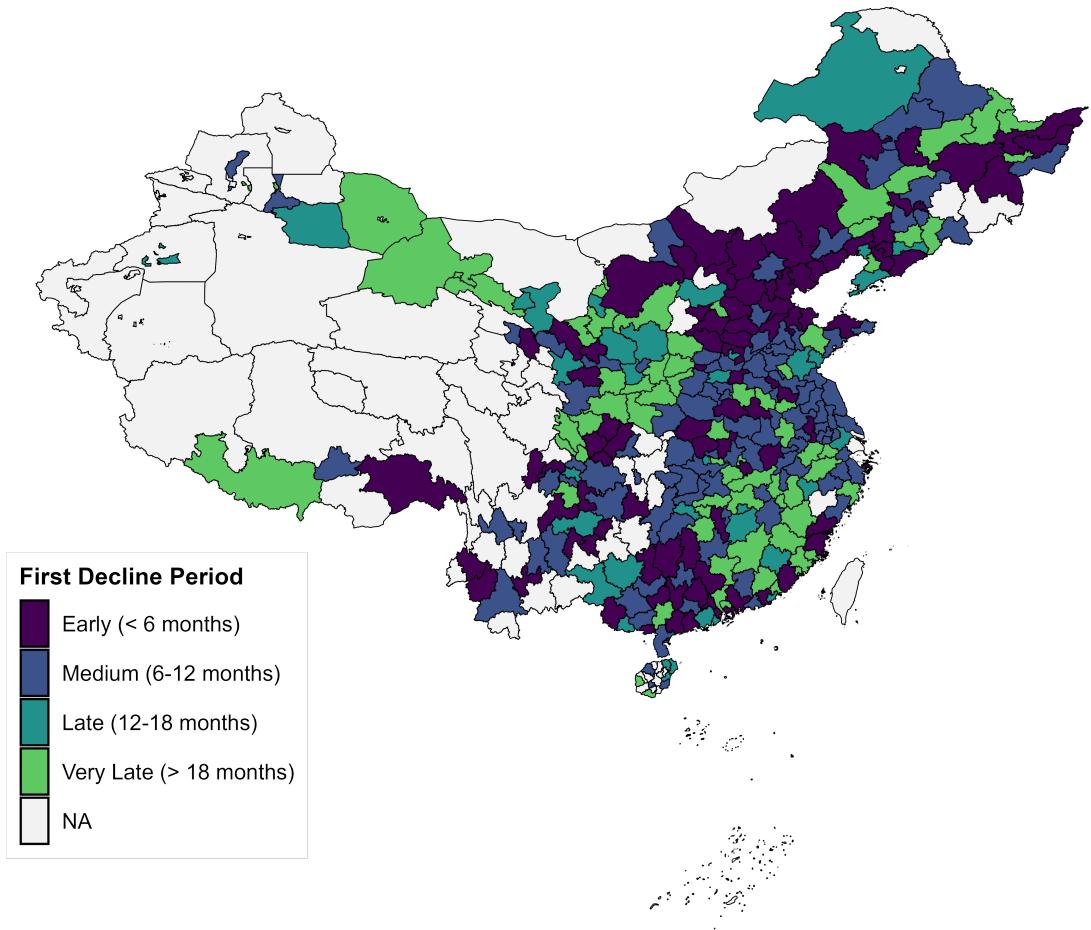


Figure 3: Structural Breakpoints in China’s Housing Market Prices, 2015-2025

Based on the breakpoint regression analysis and the temporal distribution of housing price peaks across cities, I 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 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 4). 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.

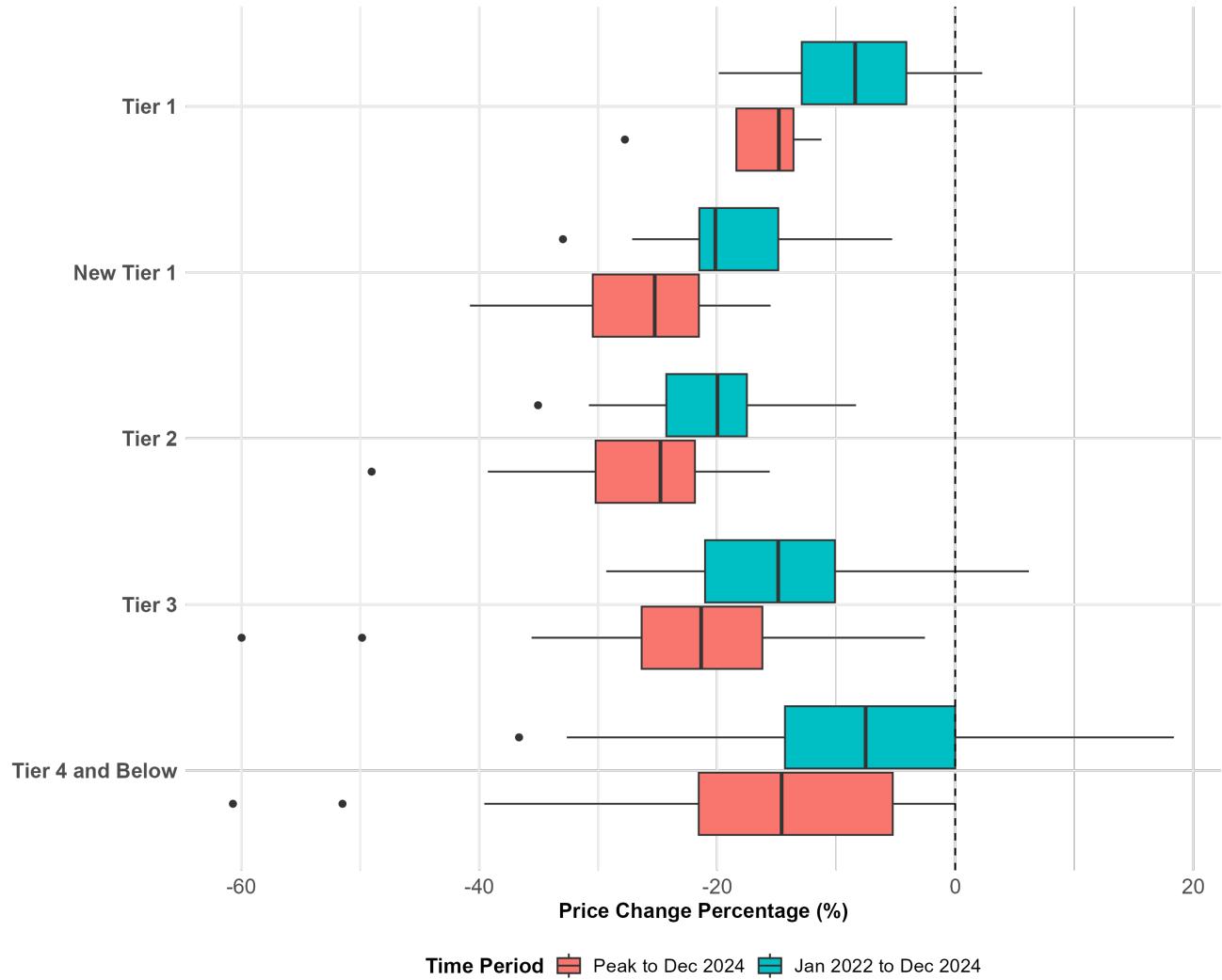
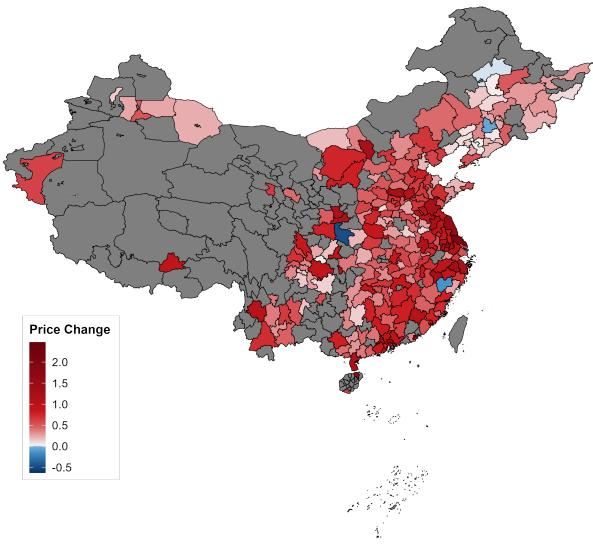


Figure 4: Housing Price Changes by City Tier and Region (Peak-to-2024 and 2022-2024)

Figure 5 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.

2015-2021



2022-2024

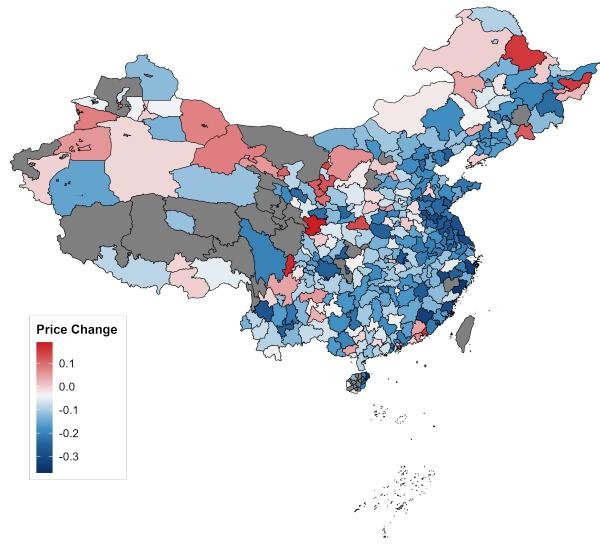


Figure 5: Housing Price Changes During Boom and Adjustment Periods Across 366 Chinese Cities

4.3 Fiscal Indicators and Structural Transformation

The evolution of fiscal indicators across city tiers, depicted in Figure 6 and Table 1, reveals structural disparities and temporal transformations that potentially explain the observed housing price resilience patterns.

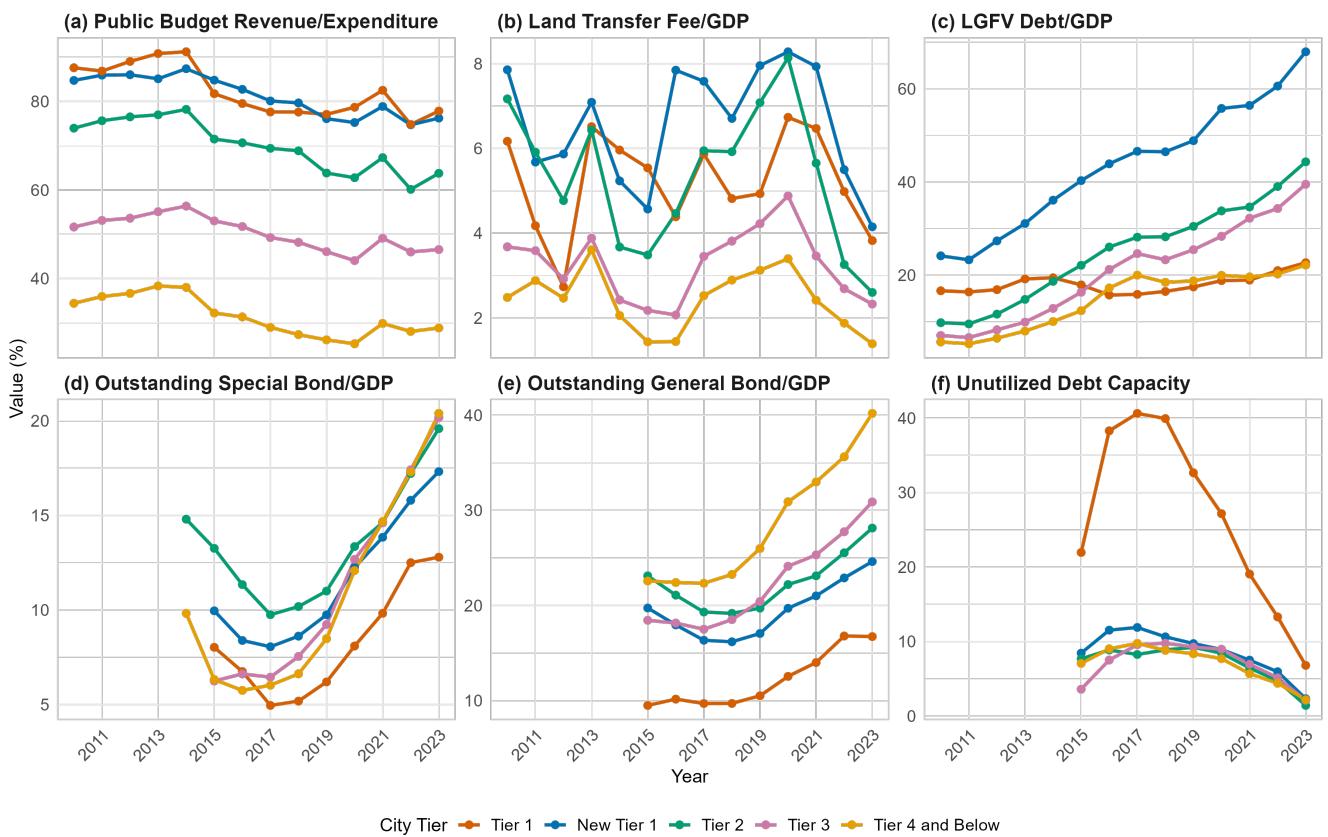


Figure 6: Fiscal Indicator Trends by City Tier (2010-2023)

Table 1: Descriptive Statistics by City Tier and Year (Mean Values)

Variable	Tier 1 (n=4)			New Tier 1 (n=15)			Tier 2 (n=30)			Tier 3 (n=65)			Tier 4 and Below (n=252)		
	2015	2021	2023	2015	2021	2023	2015	2021	2023	2015	2021	2023	2015	2021	2023
Housing Price Growth Rate	0.148	0.027	-0.004	-0.012	0.063	-0.028	-0.002	0.034	-0.042	-0.088	0.027	-0.012	-0.164	0.016	0.001
Fiscal Self-Sufficiency Rate	0.817	0.825	0.778	0.848	0.789	0.762	0.715	0.673	0.638	0.530	0.491	0.465	0.322	0.298	0.288
Land Finance Revenue/GDP	0.055	0.065	0.038	0.046	0.079	0.042	0.035	0.057	0.026	0.022	0.035	0.023	0.014	0.024	0.014
Unutilized Debt Capacity	0.220	0.191	0.068	0.084	0.075	0.023	0.077	0.064	0.014	0.036	0.069	0.021	0.071	0.057	0.022
General Bond Balance/GDP	0.101	0.042	0.039	0.084	0.072	0.073	0.114	0.085	0.085	0.130	0.107	0.107	0.156	0.184	0.198
Special Bond Balance/GDP	0.080	0.098	0.128	0.100	0.138	0.173	0.133	0.146	0.196	0.062	0.146	0.202	0.063	0.147	0.204
LGFV Debt Balance/GDP	0.179	0.189	0.227	0.403	0.564	0.679	0.221	0.346	0.443	0.163	0.322	0.395	0.124	0.196	0.222
Land Supply/Population	0.352	0.561	0.430	1.242	1.144	0.831	1.094	1.283	0.960	1.206	1.340	1.118	0.779	1.144	0.872
GDP Growth Rate	0.078	0.081	0.052	0.088	0.080	0.053	0.082	0.078	0.054	0.083	0.077	0.056	0.078	0.077	0.054
Tertiary Industry Ratio	0.684	0.723	0.704	0.524	0.581	0.579	0.482	0.536	0.532	0.418	0.479	0.488	0.409	0.463	0.466
Population Growth Rate	0.029	0.002	0.004	0.024	0.014	0.006	0.022	0.007	0.004	0.002	0.001	-0.002	-0.004	0.001	0.006
Housing Price-to-Income Ratio	0.657	0.654	0.632	0.266	0.305	0.278	0.254	0.275	0.239	0.202	0.212	0.192	0.188	0.175	0.163

Fiscal self-sufficiency ratios (Figure 6 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 (Figure 6 b) exhibits pronounced cyclical fluctuations with a precipitous decline after 2020. New Tier 1 and Tier 2 cities reached peak land revenue proportions during 2019-2020 (approximately 8%), followed by a sharp contraction to approximately 4% and 2.6% 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 6 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 6 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 6 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 6 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 Asymmetry and the Limited Role of Mean Reversion

Figure 7 illustrates the relationship between boom-period appreciation and adjustment-period declines. The actual relationship (red line, slope = 0.070) falls far below the perfect symmetry line (blue dashed line, slope = 1.0), revealing significant downward price stickiness rather than mechanical mean reversion.

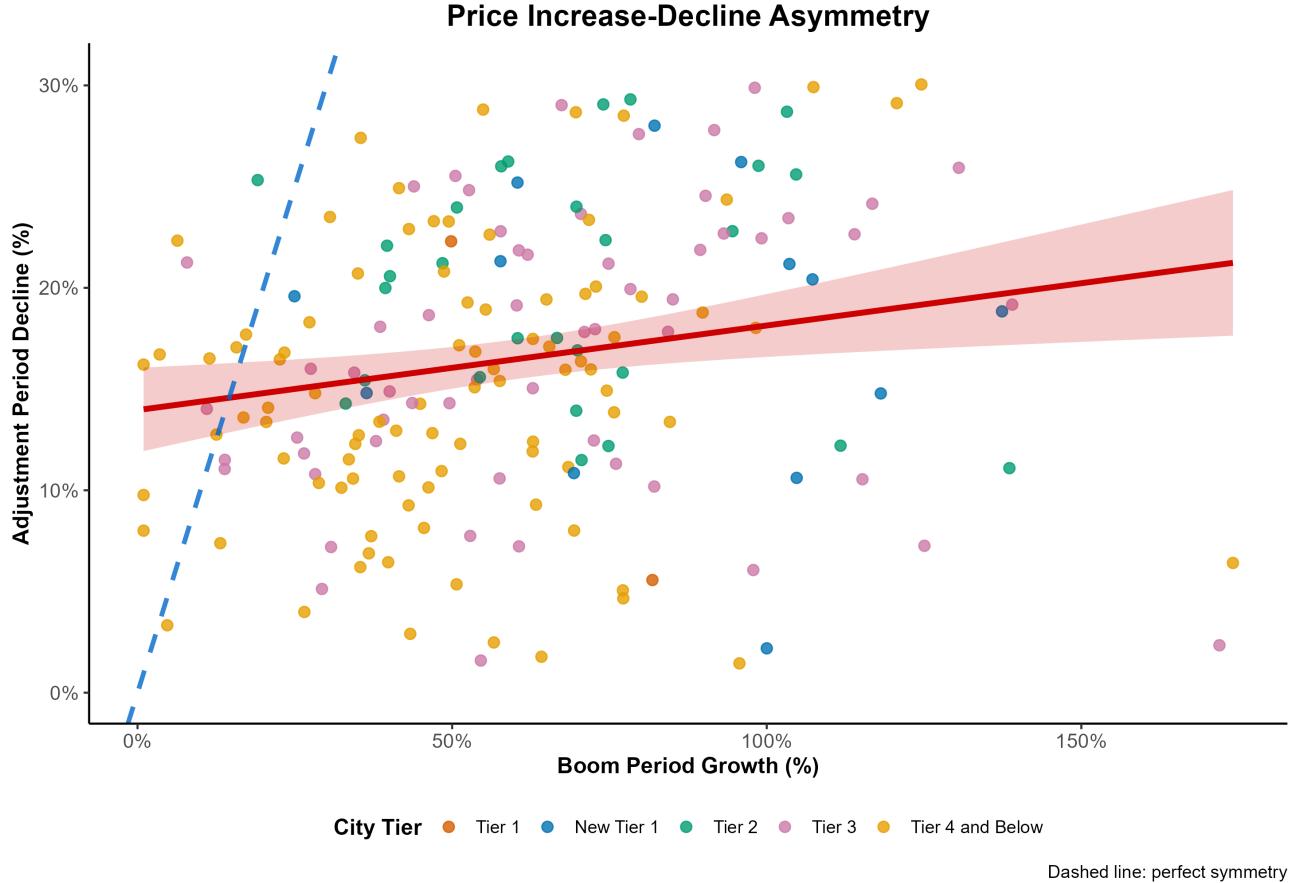


Figure 7: Boom-Bust Price Asymmetry Across Chinese Cities

Table 2 presents a horse-race analysis comparing the explanatory power of prior appreciation versus fiscal-structural factors. While boom-period growth significantly predicts adjustment-period declines, it explains only 9% of the variation. Adding fiscal variables increases explanatory power to 20%—a 124% improvement—and reduces the prior appreciation coefficient by 25%. This demonstrates that fiscal-structural determinants, not mechanical mean reversion, drive spatial heterogeneity in housing price resilience.

5. The Fiscal-Property Nexus

Our panel regression results in Table 3 reveal striking transformations in how local government fiscal structures influence housing price dynamics across market phases, illuminating the mechanisms of the fiscal-property resilience nexus.

Table 2: Prior Appreciation vs. Fiscal-Structural Determinants

Model	Prior Growth Coef.	R ²	ΔR ²	N
(1) Prior Appreciation Only	0.075 ***	0.090	–	188
(2) + Fiscal Variables	0.056 ***	0.202	+ 0.112	188
(3) + All Controls	0.054 ***	0.222	+ 0.132	188

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

Table 3: Fiscal-Housing Price Relationships Across Market Phases

	Full Period Controls	Full Period Full	Boom Phase	Adjustment Phase
House Price Change Rate (t-1)	0.27*** (0.02)	0.22*** (0.02)	0.10*** (0.03)	0.20*** (0.04)
GDP Growth Rate (t-1)	0.13* (0.08)	0.16* (0.09)	0.25* (0.14)	-0.03 (0.10)
Tertiary Industry Ratio (t-1)	-0.27*** (0.06)	-0.00 (0.07)	0.25** (0.10)	-0.28** (0.13)
Population Growth Rate (t-1)	-0.03 (0.03)	0.04 (0.04)	0.01 (0.05)	0.10* (0.06)
Housing Price-Income Ratio (t-1)	-1.67*** (0.07)	-1.51*** (0.07)	-1.05*** (0.08)	-2.23*** (0.17)
General Bond Balance/GDP (t-1)		0.36*** (0.09)	0.02 (0.13)	0.56*** (0.15)
Special Bond Balance/GDP (t-1)		-0.16*** (0.06)	-0.36*** (0.11)	0.07 (0.11)
Fiscal Self-Sufficiency Rate (t-1)		0.13*** (0.05)	0.11* (0.06)	0.08 (0.05)
Unutilized Debt Capacity(t-1)		0.05 (0.04)	0.14** (0.07)	0.14* (0.07)
Land Revenue/GDP (t-1)		0.24** (0.11)	0.04 (0.17)	0.36** (0.15)
LGFV Bond Balance/GDP (t-1)		0.01 (0.02)	0.06 (0.04)	-0.09*** (0.03)
City Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
R ²	0.27	0.29	0.25	0.37
Num. obs.	2190	1448	898	581

*** p < 0.01; ** p < 0.05; * p < 0.1

5.1 Debt-Housing Price Relationships Across Market Phases

Our panel regression results (Table 2) revealed profound transformations in how local government fiscal structures influence housing price dynamics across market phases, providing strong empirical support for the fiscal-property resilience nexus and its varying manifestations across China's urban landscape.

5.1.1 The Evolving Role of Explicit Government Debt

The relationships between explicit government debt—both general and special-purpose bonds—and housing prices exhibit striking cyclical patterns that illuminate their transformative functions across market phases. General bonds demonstrate a strong positive association with housing price resilience during adjustment periods, while remaining statistically insignificant during boom periods. Conversely, special-purpose bonds display a significant negative relationship with housing prices during boom periods, which disappears during adjustment phases as coefficients turn positive though not statistically significant.

This complementary pattern reveals the complex and evolving functions of explicit debt instruments across China's real estate market cycle. During boom periods, special bonds appear to function primarily as policy suppression mechanisms, with central government controlling their issuance to restrain overheated markets in alignment with the “housing is for living, not speculation” policy orientation. Meanwhile, general bonds remain neutral in their impact, neither fueling nor restraining appreciation.

As markets transition to adjustment phases, explicit debt instruments undergo a functional transformation toward stabilization. General bonds emerge as critical counter-cyclical policy tools that local governments deploy strategically to maintain market stability. As formal financing vehicles backed by general budget revenues, these bonds finance public service and infrastructure projects that maintain housing demand and price stability when market confidence deteriorates. This counter-cyclical regulation operates through multiple channels: enhancing housing attractiveness through improved public services, supporting housing demand through public investment-generated employment and income effects, and signaling government commitment to economic stability.

5.1.2 LGFV Debt's Cyclical Transformation

LGFV debt balances exhibit a clear role reversal across market phases. During expansion periods, LGFV debt shows a positive though insignificant relationship with housing price changes; during adjustment periods, this relationship becomes significantly negative. This transformation reveals the dual nature of China's local government implicit debt: during boom periods, LGFV debt functions as a financing tool for urban expansion and land development, potentially supporting real estate markets; during adjustment periods, these accumulated implicit liabilities transform into fiscal burdens that constrain governments' capacity to support housing markets.

The significant negative correlation between LGFV debt levels and housing prices in the recession period (post-2022) primarily stems from the debt service burden and structural adjustment pressures. As LGFV debt accumulates, debt servicing consumes an increasing portion of local government resources, creating a crowding-out effect that reduces funds available for real estate market interventions when effective demand is insufficient. Simultaneously, high-debt regions face greater regulatory pressure from central government, limiting their ability to use implicit guarantees and non-market interventions, thus allowing housing prices to more accurately reflect market fundamentals ([Chen et al. 2023](#)). This transformation in the nature of implicit debt across different market phases—from a growth catalyst during boom

periods to a fiscal burden during recessions—explains the observed negative correlation during market downturns.

5.1.3 Land Finance Dependency Effects

Land transfer revenue as a proportion of GDP displays significantly different impact patterns across market phases. During adjustment periods, this indicator shows a strong positive relationship with housing price changes, while remaining insignificant during boom periods. This contrast suggests that cities with high land finance dependency possess stronger motivations and capabilities to maintain price stability during market downturns.

This finding reveals the central role of land in China's local public finance. Land serves not only as a source of direct fiscal revenue for local governments but also as key collateral for debt financing. During market downturns, cities with high dependence on land finance tend to implement more aggressive interventions to maintain land values, as this directly relates to their fiscal stability and debt sustainability.

While these intervention strategies can maintain short-term price stability, they may also mask fundamental market supply-demand imbalances and delay necessary market adjustments. This explains why land finance dependence has a significant positive correlation with housing prices during adjustment periods, reflecting the stronger price support motivation and capacity of high-dependence cities.

5.1.4 Fiscal Self-Sufficiency and Debt Capacity

Fiscal self-sufficiency ratios demonstrate significant positive influence on housing prices during boom periods, but this influence weakens and becomes insignificant during adjustment periods. In contrast, unutilized debt capacity shows importance during both boom and adjustment periods, highlighting the crucial role of maintaining adequate debt space for local governments' ability to stabilize housing prices.

This finding highlights the impact of fiscal structure on local governments' intervention capabilities. Cities with high fiscal self-sufficiency can better leverage their own resources to drive housing price increases during boom periods, but this advantage weakens during adjustment periods, possibly because market downward pressure exceeds the supporting capacity of fiscal resources. In contrast, maintaining adequate debt space provides local governments with the flexibility to respond across different market phases, particularly enabling counter-cyclical interventions during adjustment periods through financing.

This pattern aligns with recent research findings indicating that local government debt capacity significantly impacts their ability to manage economic fluctuations. The interaction between fiscal self-sufficiency and debt space forms the foundation of local governments' capacity to respond to real estate market fluctuations ([Ambrose, Deng, and Wu 2015](#)).

5.1.5 Control Variable Phase Differences

Control variables also exhibit clear market phase differences. Housing price-income ratios show substantially stronger negative effects during adjustment periods than during boom periods, indicating that housing affordability constraints exert more significant suppressive effects on prices during market downturns. Additionally, tertiary industry ratios display positive influences during boom periods but turn negative during adjustment periods, potentially reflecting service-oriented cities' stronger attractiveness during market expansion but greater vulnerability during adjustments.

This differentiated impact of industrial structure in interaction with economic cycles is particularly important. Regions with developed service industries typically have more diversified economic activities and higher human capital concentration, which can support stronger real estate demand during boom periods. However, these regions tend to be more sensitive to consumer confidence and macroeconomic environments, leading to greater demand contraction pressure during adjustment periods.

In contrast, industry-dominated cities, while lacking the same housing price growth momentum during boom periods, may exhibit stronger resilience in their production-oriented economic activities during adjustment periods, providing relatively stable support for the real estate market. This differentiated response explains why industrial structure variables show drastically different directions of influence across different market phases.

5.2 Regional Differentiation

The regional models (Table 4) reveal varying relationships between fiscal variables and housing price growth across China's eastern, central, northeastern, and western regions. These differences potentially reflect regional economic structures, fiscal practices, and housing market characteristics.

In the eastern region, fiscal instruments show a more pronounced influence on property markets. The positive association between general bond financing and housing price growth suggests that fiscal resources in this region may be channeled into infrastructure or public services that enhance locational value. This aligns with the region's economic development, where more efficient capital allocation might amplify the effects of fiscal spending on housing markets. The insignificant impact of special bonds, despite their post-2022 role in acquiring unsold housing inventory for affordable housing, could reflect offsetting effects: while these acquisitions may alleviate developer liquidity pressures in primary markets, they might simultaneously introduce affordable housing supply that competes with secondary market listings.

Fiscal self-sufficiency shows a significant positive association with housing price growth exclusively in the eastern region. This may suggest that eastern localities with stronger revenue-generating capabilities can better support property market development through enhanced public services and infrastructure investment without excessive dependence on central transfers. These governments possibly have greater flexibility to implement policies that indirectly benefit housing markets. In contrast, regions more dependent on transfer payments may have less autonomy in fiscal decision-making.

Unutilized debt capacity shows significant positive associations with housing price growth in both eastern and western regions, with larger effects in the latter. This variable might indicate a local government's potential to continue infrastructure investment and economic support. The stronger effect in western regions could suggest that in less developed areas, where private sector activity is more limited, government investment capacity may play a more important role in shaping market expectations about future development.

Land revenue's marginally significant positive relationship with housing price growth exclusively in western regions may reflect different regional development patterns. In these developing regions, land revenue possibly constitutes a larger proportion of discretionary fiscal resources and more directly finances visible urban projects. Western local governments, facing more constrained tax bases, might rely more heavily on land monetization to fund development that enhances property values.

The insignificance of LGFV bond issuance across all regions contrasts with its negative significance in the adjustment period model for all cities presented in the previous section. This discrepancy likely

Table 4: Regional Heterogeneity in Fiscal-Housing Price Resilience During Market Adjustment Phase

	East (Adj.)	Central (Adj.)	Northeast (Adj.)	West (Adj.)
Price Change (t-1)	0.24*** (0.06)	0.27*** (0.08)	-0.16 (0.21)	0.27** (0.12)
General Bond/GDP (t-1)	0.63** (0.29)	0.11 (0.26)	0.18 (0.53)	0.10 (0.35)
Special Bond/GDP (t-1)	0.13 (0.16)	0.19 (0.19)	-0.00 (0.50)	-0.24 (0.35)
Fiscal Self-Sufficiency (t-1)	0.15** (0.07)	-0.18 (0.14)	-0.00 (0.23)	0.01 (0.13)
Unutilized Debt Capacity (t-1)	0.32*** (0.12)	-0.03 (0.11)	0.15 (0.39)	0.46** (0.22)
Land Revenue/GDP (t-1)	0.29 (0.19)	0.39 (0.30)	0.16 (0.67)	0.82* (0.41)
LGFV Bond/GDP (t-1)	-0.05 (0.04)	0.07 (0.10)	-0.10 (0.07)	-0.04 (0.12)
GDP Growth Rate (t-1)	-0.15 (0.16)	0.08 (0.18)	-0.37 (0.39)	-0.02 (0.33)
Tertiary Industry Ratio (t-1)	-0.18 (0.20)	-0.05 (0.26)	-0.16 (0.56)	0.10 (0.32)
Population Growth (t-1)	0.28 (0.38)	0.36 (0.36)	0.02 (0.09)	-0.00 (0.51)
Housing Price-Income Ratio (t-1)	-1.95*** (0.20)	-3.89*** (0.44)	-1.94** (0.74)	-3.66*** (0.48)
Region Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
R ²	0.46	0.48	0.30	0.52
Num. obs.	244	155	65	117

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

stems from the reduced statistical power in the smaller regional subsamples. When data are divided by region, the sample size decreases substantially, potentially making it difficult to detect statistically significant relationships that are evident in the larger dataset. Another possibility is that the negative effect of LGFV bonds on housing prices during adjustment periods might be concentrated in specific cities across different regions rather than being a region-specific phenomenon. The negative impact may be distributed across regions in a way that becomes statistically diluted when analyzed separately by region, but remains detectable when all cities are examined together.

Central and northeastern regions show no significant associations between fiscal variables and housing price growth. For central regions, this may indicate structural economic transition challenges, where fiscal resources might be directed toward industrial restructuring rather than urban amenity enhancement. In northeastern regions, demographic challenges including population outflows could potentially weaken housing demand responsiveness to fiscal stimulus, though the smaller sample size warrants caution in interpretation.

The consistently negative and significant coefficient on the housing price-income ratio across all regions suggests a tendency toward mean reversion in China's housing markets. This indicates that when housing becomes less affordable relative to local incomes, price growth tends to moderate, regardless of regional context or fiscal conditions.

These regional variations highlight the differentiated nature of China's property markets and suggest varying effectiveness of fiscal mechanisms across development stages. Eastern regions appear to demonstrate stronger connections between fiscal variables and housing outcomes, while other regions show more limited or specialized relationships. These findings suggest that fiscal-property policy interventions may need regional calibration, as identical fiscal measures might produce different market responses across China's diverse economic landscape.

5.3 City-Tier Differentiation

Analysis across city tiers (Table 5) reveals distinct patterns in how fiscal variables influence housing markets at different levels of the urban hierarchy. The tier-based regression results complement our regional analysis by providing insights into policy transmission mechanisms based on urban development levels.

General bond issuance positively affects housing price growth across multiple city tiers, with the strongest effect in tier-1/new tier-1 cities, where the coefficient is approximately four times larger than in lower-tier cities. This suggests that bond-financed investments generate higher property value premiums in major metropolitan areas, where land constraints and agglomeration economies may amplify capitalization effects.

Fiscal self-sufficiency shows an interesting pattern: negative (though insignificant) in tier-1 cities but positive and significant in tier-4 and below cities. This suggests that in smaller cities, greater fiscal autonomy enables more effective support for local property markets, while this relationship may not hold in major cities with already robust fiscal capacity.

Both unutilized debt capacity and land revenue show significant positive effects exclusively in tier-3 cities. This may indicate that mid-tier cities occupy a transitional position in China's urban hierarchy—developed enough to convert potential government investment and land financing into housing appreciation, yet not so developed that these effects are already priced into market expectations.

LGFV bond issuance maintains a negative relationship with housing price growth across all tiers but achieves statistical significance only in tier-4 and below cities. This suggests that the debt burden of

Table 5: Tier Heterogeneity in Fiscal-Housing Price Relationships During Market Adjustment Phase

	T1 and NT1 (Adj.)	Tier 2 (Adj.)	Tier 3 (Adj.)	T4 and Below (Adj.)
Price Change (t-1)	0.19 (0.14)	0.09 (0.10)	0.24*** (0.07)	0.19*** (0.07)
General Bond/GDP (t-1)	2.23* (1.19)	0.44 (0.52)	0.54** (0.27)	0.45** (0.21)
Special Bond/GDP (t-1)	-0.90 (0.60)	-0.21 (0.24)	-0.11 (0.21)	0.16 (0.16)
Fiscal Self-Sufficiency (t-1)	-0.24 (0.23)	0.15 (0.10)	0.01 (0.08)	0.20* (0.11)
Unutilized Debt Capacity (t-1)	-0.03 (0.17)	-0.17 (0.20)	0.28* (0.14)	-0.08 (0.13)
Land Revenue/GDP (t-1)	-0.59 (0.52)	-0.30 (0.27)	0.50* (0.28)	0.31 (0.32)
LGFV Bond/GDP (t-1)	-0.21 (0.20)	-0.04 (0.07)	-0.03 (0.06)	-0.14*** (0.05)
GDP Growth Rate (t-1)	0.55 (0.46)	0.41 (0.31)	-0.01 (0.15)	-0.17 (0.18)
Tertiary Industry Ratio (t-1)	1.97*** (0.55)	-0.74** (0.30)	-0.48* (0.26)	-0.26 (0.20)
Population Growth Rate (t-1)	0.34 (0.48)	0.40 (0.94)	0.11 (0.33)	0.10* (0.06)
Housing Price-Income Ratio (t-1)	-1.83*** (0.33)	-1.55*** (0.35)	-1.81*** (0.37)	-3.19*** (0.34)
City Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
R ²	0.77	0.57	0.33	0.42
Num. obs.	54	87	173	267

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

financing vehicles may particularly outweigh development benefits in smaller cities with weaker fiscal fundamentals and more limited economic bases.

The tertiary industry ratio exhibits a striking contrast, showing a strong positive effect in tier-1/new tier-1 cities but significant negative effects in tier-2 and tier-3 cities. This divergence reflects different economic structures: in major cities, service sector growth likely enhances amenities and attracts high-income residents, while in mid-tier cities, it may divert resources from sectors more directly supporting housing markets.

The housing price-income ratio maintains a consistently negative and significant association with housing price growth across all city tiers, with the strongest effect in tier-4 and below cities, suggesting that affordability constraints bind more tightly in areas with lower average incomes.

6. The Functional Transformation of Land Supply

Building on our regional and city-tier analyses, this section examines the more nuanced functional relationship between fiscal variables and housing price growth by introducing land supply as a mediating mechanism. The mediation analysis (Table 10) disentangles the total effect of fiscal variables on housing prices into direct effects and indirect effects transmitted through land supply, revealing a more complex fiscal-property nexus that varies across market conditions.

Table 6: Fiscal-Housing Price Relationship: Mediation Analysis Across Market Phases

	Full Period			Boom Period			Adjustment Period		
	Total	Path A	Direct	Total	Path A	Direct	Total	Path A	Direct
House Price Change Rate (t-1)	0.215*** (0.022)	0.282* (0.161)	0.204*** (0.024)	0.104*** (0.030)	0.430*** (0.152)	0.095*** (0.030)	0.197*** (0.042)	-0.323 (0.778)	0.014 (0.062)
General Bond Balance/GDP (t-1)	0.362*** (0.088)	-0.504 (0.717)	0.389*** (0.106)	0.024 (0.131)	0.322 (0.355)	0.012 (0.130)	0.556*** (0.146)	-13.255*** (4.039)	0.329 (0.332)
Special Bond Balance/GDP (t-1)	-0.159*** (0.058)	-0.398 (0.491)	-0.229*** (0.073)	-0.357*** (0.108)	-0.041 (0.421)	-0.371*** (0.107)	0.065 (0.107)	-2.137 (2.410)	0.131 (0.193)
Fiscal Self-Sufficiency Rate (t-1)	0.125*** (0.045)	0.509 (0.343)	0.096* (0.051)	0.106* (0.060)	-0.046 (0.163)	0.105* (0.060)	0.077 (0.053)	1.355* (0.800)	0.139** (0.064)
Unutilized Debt Capacity(t-1)	0.053 (0.042)	-0.311 (0.337)	0.047 (0.050)	0.141** (0.071)	0.092 (0.330)	0.142** (0.070)	0.136* (0.074)	-0.136 (1.922)	-0.145 (0.154)
Land Revenue/GDP (t-1)	0.243** (0.108)	3.095*** (0.810)	0.237** (0.121)	0.040 (0.171)	1.527** (0.767)	0.019 (0.170)	0.363** (0.152)	-7.257*** (2.360)	0.540*** (0.193)
LGFV Bond Balance/GDP (t-1)	0.012 (0.017)	-0.072 (0.143)	0.034 (0.021)	0.061 (0.040)	-0.034 (0.115)	0.068* (0.040)	-0.091*** (0.032)	-1.278 (1.018)	-0.084 (0.082)
GDP Growth Rate (t-1)	0.164* (0.085)	-0.472 (0.635)	0.172* (0.094)	0.246* (0.139)	-0.338 (0.649)	0.262* (0.139)	-0.026 (0.105)	-2.637 (1.744)	-0.273* (0.140)
Tertiary Industry Ratio (t-1)	-0.002 (0.070)	-0.967* (0.544)	0.043 (0.081)	0.246** (0.098)	-0.168 (0.413)	0.250** (0.098)	-0.277** (0.132)	5.066 (3.146)	-0.249 (0.253)
Population Growth Rate (t-1)	0.043 (0.035)	-0.622** (0.259)	0.029 (0.038)	0.013 (0.050)	-0.753*** (0.252)	0.029 (0.050)	0.104* (0.056)	-1.564* (0.898)	0.063 (0.072)
Housing Price-Income Ratio (t-1)	-1.505*** (0.073)	-0.009 (0.560)	-1.677*** (0.083)	-1.050*** (0.080)	-0.461 (0.326)	-1.038*** (0.080)	-2.229*** (0.173)	3.472 (3.371)	-2.862*** (0.270)
Land Supply Population Ratio (t)			0.008* (0.005)			0.019** (0.007)			-0.002 (0.006)
City Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.292	0.032	0.314	0.248	0.035	0.255	0.366	0.130	0.485
Num. obs.	1448	1261	1260	898	982	897	581	394	394

 *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

6.1 Land Supply as a Transmission Channel

The results indicate that land supply serves as a significant transmission channel for several fiscal variables, but its function transforms dramatically between boom and adjustment periods. In the full sample, land fiscal dependency (land revenue to GDP ratio) exhibits the strongest mediation pattern: while maintaining a significant positive direct effect on housing price growth, it also shows a substantial positive effect on land supply. This suggests that localities more dependent on land finance strategically expand land supply, possibly to sustain the land-finance cycle by creating new development opportunities that generate future revenue.

General bond balance presents a contrasting pattern across market phases. In the full sample and adjustment period, higher general bond balance shows significant positive total effects on housing price growth. However, during adjustment periods, higher general bond balance demonstrates a strong negative relationship with land supply, while maintaining a positive though insignificant direct effect on housing prices. This suggests that areas with higher accumulated general bond debt may operate differently during market adjustments—as local governments with higher debt levels seek to stabilize their fiscal position, they simultaneously restrict land supply, potentially to prevent price collapse in oversupplied markets. This aligns with our earlier finding that general bonds have stronger positive effects in eastern regions and tier-1 cities, where land constraints are more binding and supply restriction more impactful.

Fiscal self-sufficiency exhibits an intriguing pattern during adjustment periods: while its total effect on housing price growth is not statistically significant, it shows both a significant positive effect on land supply and a significant positive direct effect on housing prices. This seemingly contradictory result suggests a suppression effect, where the indirect path through land supply and the direct effect operate in opposing directions, ultimately canceling each other out in the total effect. During market adjustments, fiscally self-sufficient localities appear to increase land supply (positive Fiscal→Supply coefficient), but increased land supply might exert downward pressure on prices. Simultaneously, these fiscally stronger localities implement direct market-supporting measures that positively affect housing prices (positive Direct Effect). This offsetting mechanism explains why fiscal self-sufficiency showed varied significance across our regional and city-tier analyses - its complex dual-pathway effect depends on local contextual factors that determine which mechanism dominates.

6.2 Reversed Transmission During Market Adjustment

A striking transformation occurs in the land supply channel during the adjustment period compared to the boom period. During boom times, both land fiscal dependency and previous housing price growth positively influence land supply, suggesting an expansionary cycle where appreciating markets and land-dependent fiscal structures drive further land release. This pattern reverses dramatically during adjustment periods, where land fiscal dependency, general bond balance, and population growth all exhibit strong negative relationships with land supply.

This reversal reveals a fundamental shift in local government land strategy: during booms, governments with higher land fiscal dependency capitalize on rising markets by expanding supply; during adjustments, localities with higher accumulated bond debt or greater land fiscal dependency strategically restrict land release to prevent price collapse. The negative relationship between population growth and land supply during adjustments further suggests that even high-demand areas implement supply restrictions during downturns, prioritizing price stability over accommodating demographic pressures.

6.3 Market-Dependent Direction of Land Supply Effects

The impact of land supply on housing prices itself exhibits market phase dependency. During boom periods, land supply demonstrates a positive effect on housing prices, suggesting that expanded supply signals continued development momentum that investors interpret positively. However, during adjustment periods, this relationship becomes negative though insignificant, reflecting the traditional supply-price dynamic where increased supply moderates prices in weakened markets.

This reversal helps explain some of the regional and tier-based variations observed earlier. The stronger fiscal-price relationships in eastern regions and tier-1 cities likely reflect not just their more developed institutional environments, but also their more sophisticated management of land supply as a policy instrument. The particularly strong effect of general bond balance in tier-1 cities aligns with these areas' greater capacity to strategically restrict land supply during adjustments, creating scarcity premiums that support price levels.

6.4 Conditional Direct Effects

The mediation analysis also reveals that many fiscal variables' direct effects on housing prices are conditional on market phase. Special bond balance exhibits a significant negative effect during boom periods but becomes insignificant during adjustments. Conversely, unutilized debt capacity shows significant positive effects during both boom and adjustment periods, though through different mechanisms. In boom periods, this effect operates directly with no significant mediation through land supply, suggesting market confidence effects; during adjustments, the mediation pathway becomes more complex with offsetting direct and indirect effects.

LGFV bond balance similarly demonstrates market-contingent effects: positive during booms but negative during adjustments, with no significant mediation through land supply in either phase. This reinforces our earlier finding that LGFV bond dependency varies by city tier, with the negative effect during adjustments particularly pronounced in smaller cities with weaker fiscal fundamentals. These findings illuminate the dynamic nature of China's fiscal-property nexus, where land supply functions not merely as a passive transmission channel but as an actively managed policy instrument that local governments calibrate according to market conditions. The effectiveness of fiscal variables in influencing housing markets depends not only on regional and city-tier characteristics, but also on the strategic deployment of land supply as both a revenue source and a market stabilization tool. This multidimensional relationship explains why identical fiscal measures produce heterogeneous outcomes across China's diverse urban landscape and varying market conditions.

7. Robustness check

To validate the reliability of our core findings, I conducted two alternative tests. First, Table 7 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.

Table 7: Comparison of Housing Price Changes by City Tiers

City Category	Peak to 2024 Change (%)		2022 to 2024 Change (%)		Num of cities	
	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

Second, 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 8 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.

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 9 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 demon-

Table 8: Robustness Check with Alternative Market Phase Demarcation (2021)

	Full Period	2015-2020	2021-2024
House Price Change Rate (t-1)	0.22*** (0.02)	0.10*** (0.03)	0.25*** (0.03)
General Bond Balance/GDP (t-1)	0.36*** (0.09)	0.02 (0.13)	0.40*** (0.12)
Special Bond Balance/GDP (t-1)	-0.16*** (0.06)	-0.36*** (0.11)	0.12 (0.08)
Fiscal Self-Sufficiency Rate (t-1)	0.13*** (0.05)	0.11* (0.06)	0.13*** (0.05)
Unutilized Debt Capacity (t-1)	0.05 (0.04)	0.14** (0.07)	0.11** (0.05)
Land Revenue/GDP (t-1)	0.24** (0.11)	0.04 (0.17)	0.29** (0.11)
LGFV Bond Balance/GDP (t-1)	0.01 (0.02)	0.06 (0.04)	-0.03 (0.02)
GDP Growth Rate (t-1)	0.16* (0.09)	0.25* (0.14)	0.11 (0.07)
Tertiary Industry Ratio (t-1)	-0.00 (0.07)	0.25** (0.10)	-0.19* (0.11)
Population Growth Rate (t-1)	0.04 (0.04)	0.01 (0.05)	0.06* (0.04)
Housing Price-Income Ratio (t-1)	-1.51*** (0.07)	-1.05*** (0.08)	-1.67*** (0.13)
City Fixed Effects	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes
R ²	0.29	0.25	0.30
Adjusted R ²	0.17	0.01	0.03
Observations	1448	898	780

Table 9: 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** (1.025)	0.162* (0.088)
Special Bond Balance/GDP	-1.724 (1.430)	-0.021 (0.112)
Fiscal Self-Sufficiency Rate	-0.506 (0.514)	-0.016 (0.044)
Unutilized Debt Capacity	1.953* (1.046)	-0.038 (0.145)
Land Revenue/GDP	-4.649* (2.792)	-0.718*** (0.214)
LGFV Debt Balance/GDP	0.090 (0.372)	-0.019 (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

ing that predetermined fiscal structures can effectively predict subsequent housing market performance across different phases. The contrasting coefficient magnitudes and significance patterns across boom and bust periods provide compelling evidence for the phase-dependent fiscal-property nexus identified in our panel analysis.

Fourth, the mediation analysis with alternative periodization in Table 10 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 10: 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*** (0.030)	0.393*** (0.150)	0.071** (0.036)	0.254*** (0.035)	-0.356 (0.501)	0.178*** (0.043)
General Bond Balance/GDP (t-1)	0.024 (0.131)	0.432 (0.369)	-0.132 (0.163)	0.401*** (0.117)	-4.043* (2.159)	0.136 (0.186)
Special Bond Balance/GDP (t-1)	-0.357*** (0.108)	-0.151 (0.476)	-0.454*** (0.149)	0.118 (0.083)	-2.574* (1.457)	0.150 (0.126)
Fiscal Self-Sufficiency Rate (t-1)	0.106* (0.060)	-0.064 (0.165)	0.105 (0.079)	0.125*** (0.047)	0.000 (0.638)	0.150*** (0.055)
Unutilized Debt Capacity(t-1)	0.141** (0.071)	0.337 (0.363)	0.142 (0.100)	0.108** (0.052)	-1.141 (0.841)	0.031 (0.072)
Land Revenue/GDP (t-1)	0.040 (0.171)	2.238*** (0.801)	-0.037 (0.222)	0.292** (0.114)	-0.573 (1.529)	0.307** (0.131)
LGFV Bond Balance/GDP (t-1)	0.061 (0.040)	0.027 (0.139)	0.046 (0.056)	-0.028 (0.018)	0.072 (0.275)	0.004 (0.024)
GDP Growth Rate (t-1)	0.246* (0.139)	-0.457 (0.755)	0.429* (0.231)	0.107 (0.073)	-0.723 (0.971)	0.092 (0.083)
Tertiary Industry Ratio (t-1)	0.246** (0.098)	-0.631 (0.434)	0.299** (0.124)	-0.193* (0.106)	-0.329 (1.873)	0.021 (0.161)
Population Growth Rate (t-1)	0.013 (0.050)	-0.290 (0.262)	0.086 (0.067)	0.063* (0.037)	0.199 (0.571)	0.048 (0.049)
Housing Price-Income Ratio (t-1)	-1.050*** (0.080)	-0.406 (0.318)	-1.057*** (0.095)	-1.674*** (0.125)	3.955* (2.014)	-1.961*** (0.174)
Land Supply Population Ratio (t)			0.031*** (0.010)			-0.004 (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 366 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, I employ a granular decomposition of local government fiscal indicators that goes beyond the conventional aggregated analysis. By precisely differentiating between general bonds, special-purpose bonds, and LGFV debt, I identify distinct impact pathways of different debt types on housing markets. This fine-grained analysis reveals that these fiscal instruments operate through phase-dependent mechanisms—general bonds function as counter-cyclical stabilization tools during market corrections, while LGFV debt transforms from a growth catalyst to a fiscal burden that constrains intervention capacity.

Second, I identify a non-linear relationship between fiscal conditions and housing price resilience that produces a distinctive “barbell effect” across China’s urban hierarchy. Both Tier 1 cities (with strong fiscal self-sufficiency) and Tier 4+ cities (with higher explicit debt financing) demonstrate greater price stability than mid-tier cities heavily dependent on implicit financing through LGFVs. This pattern challenges conventional assumptions about economic development and market stability, revealing that fiscal structure composition—not merely economic development level—determines a city’s capacity to maintain housing price stability during downturns.

Third, I innovatively examine land supply as a mediating mechanism in the fiscal-property nexus, using land listing data to trace government behavior directly. Our mediation analysis uncovers a functional transformation of land supply from a growth-oriented revenue-generating tool during boom periods to a strategic market stabilization instrument during corrections. High land-finance dependent cities strategically restrict supply during downturns to maintain price levels, creating spatially differentiated patterns of housing market resilience.

Despite these contributions, our study has several limitations. The relatively short adjustment period (2022-2024) may not capture the full market correction cycle. Potential omitted variables at the city level could still influence both fiscal conditions and housing prices despite our methodological precautions. Additionally, our city-level aggregates may obscure important within-city spatial variations in housing price resilience.

Future research should explore how these fiscal-property relationships evolve over longer market cycles, potentially employing quasi-experimental designs to strengthen causal inference. Additional work is needed to understand how fiscal structures interact with demographic shifts, industrial transformation, and central-local fiscal relations to shape housing market outcomes. Intra-urban analyses could also reveal how fiscal pressures create spatially uneven development patterns within cities.

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